THE MAC Flyer

December 1986

Taxi Mishaps . . . Page 17

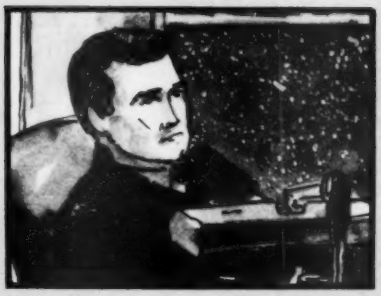
THE MAC Flyer

For Greater Safety in MAC Air Operations

December 1986 | MACRP 127-5 | VOL XXXIII NO. 12

Gen Duane H. Cassidy — Commander in Chief
Brig Gen James D. Kellim — Inspector General
Col Richard W. Blatter — Director of Safety

Maj Thomas C. Weinzierl — Supervising Editor
Capt Donald L. Rosenberry — Associate Editor
Capt Michael J. Iltis — Associate Editor
Mrs Frances A Caldwell — Managing Editor
Mr Tom O'Laughlin — Art Director



page 5

page 9

FEATURES

5 **A Christmas Message**
A boisterous bar, not enough rest . . .

9 **Invisible Killers**
Brad MacKenzie examines some "nasties."

17 **Taxi (OOPS!) Mishaps**
The eyes don't always have it.

21 **What the heck is *TMF?***

22 ***TMF* Instrument Quiz**
Approaching Colorado.

24 **Reporting Points**
Communicate with precision.

31 **Annual Index**

DEPARTMENTS

12 **Mishap With A Moral**
16 **Flying Hour Milestones**
27 **Quick Stoppers**
30 **After Deadlines**

The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225-5101, or Autovon 576-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes of address for subscription mailing should be sent to GPO. Give both old and new addresses, including zip codes. USAF Active and Air Reserve Forces units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC Support personnel. Distribution X; OPR: HQ MAC/IGFE ISSN 0024-788X.

General Cassidy's Holiday Message

GENERAL DUANE H. CASSIDY, CINCMAC

For Americans, the holiday season is a time of celebration, of hope, peace, and joy. It is a time we want to share with our loved ones. It is also an appropriate time to reflect upon our good fortune as Americans.

Our nation was founded upon the ideals of freedom, individual rights, and opportunities to excel. Our founders realized such ideals were possible only if Americans were willing to sacrifice for future generations' peace and prosperity.

We inherited freedom from their tradition of work and sacrifice. In the past year, the MAC team played a big part in keeping freedom alive in many parts of the world. All of MAC—strategic and tactical, rescue, special operations, aeromedical evacuation, weather, audiovisual—has played a part and excelled through their active, Guard or Air Reserve role.

You, the men and women of MAC, kept alive our tradition of service to others: when called upon, you delivered. You predicted violent weather, moved others from harm's way, carried medical supplies to disaster sites around the world, rescued children from mountain blizzards, and air-evacuated patients for life-saving surgery. Being able to do this work is a gift, and is given only to the fortunate few.

From our republic's beginning, the ideal of neighbor helping neighbor has been a distinguishing mark of the American experience and one of the primary causes of our nation's greatness. America's continuing greatness is being built by you—remarkable, selfless members of the MAC team, who give time, labor, and love to help our neighbor. . . . Your actions bring joy to others and make their world, our world, a better place.

On the eve of this holiday season, Mrs Cassidy and I extend to you and your family our warmest and sincere wishes for a peaceful, safe, and prosperous 1987.

Next!

"And what would you like for Christmas, young person?" asked the department store Santa of the rather overgrown "kid" sitting on his knee.

"Well Santa, I'd like First Prize in the 1987 MAC Flight Safety Writing Contest."

"Isn't that the contest sponsored by the highly intelligent and capable staff of *The MAC Flyer?*"

" Yes it is, Santa, and I want the First Prize."

"Well, my boy, I eagerly await *my* monthly copy of *The MAC Flyer* so I can catch up on the latest in the field of flight safety (I *am* an aviator, you know), so I'm somewhat familiar with the contest. I know you have to submit a flight safety-related story by 31 March 1987 and it must be 1,000 to 3,000 words long. (Poetry must be 75 to 100 lines.) Plus there are other ancillary rules you have to follow. Sorry, sonny, but this is one present you have to earn for yourself. But don't let that deter you. It's a highly worthy endeavor. Everyone with a flight safety message to tell has a moral obligation to enter."

"Well, okay, Santa. In that case I'd like a copy of Major Hairy Lifter's book *"7,000 Box Lunches over the North Atlantic—My Life as a MAC Pilot."*

"I'll see what old Santa can do, sonny." (Boy, you really meet some weirdos on this job. A leaker to boot. Oh, well! At least the store pays the cleaning bill.)

"Next! And what would you like for Christmas, little girl?" ✯

THE RULES

The 1987 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1987. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages). Poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message.* Manuscripts must be double-spaced, typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. The cover sheet must contain a brief autobiography.

The contest is open to anyone. Entries qualifiying under the above rules earn their author a free one-year subscription to *The MAC Flyer.* However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a special category. All winning stories will be published in *The MAC Flyer.* Entries should be addressed to:

Flight Safety Writing Contest
HQ MAC/IGFE
SCOTT AFB, IL 62225-5101

A Christmas Message

Is it yours?

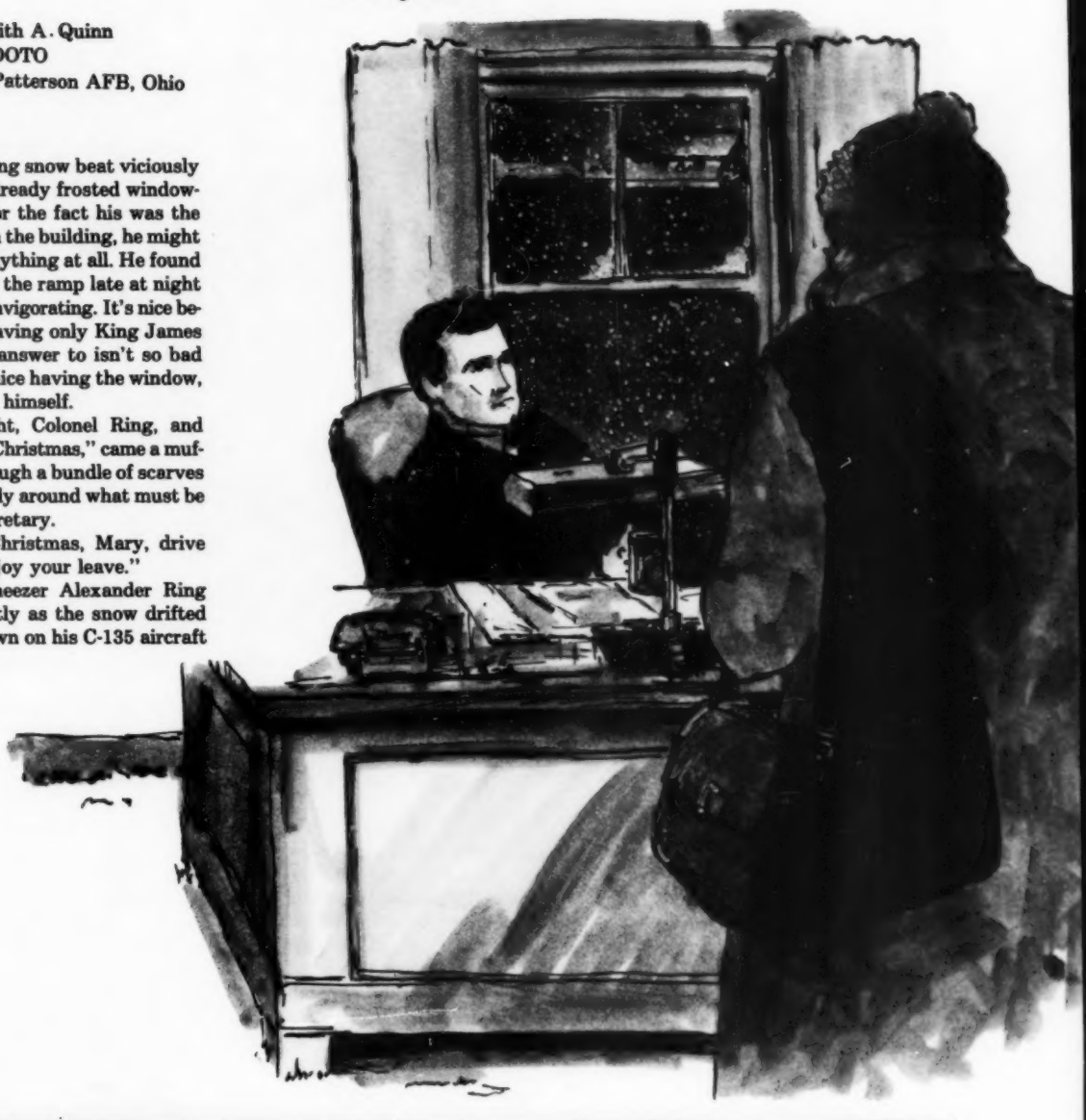
by Capt. Keith A. Quinn
4950th DOTO
Wright-Patterson AFB, Ohio

The swirling snow beat viciously on the already frosted windowpane. If not for the fact his was the only window in the building, he might never finish anything at all. He found looking out on the ramp late at night soothing, yet invigorating. It's nice being the DO; having only King James the Worst to answer to isn't so bad and it sure is nice having the window, he thought to himself.

"Goodnight, Colonel Ring, and have a Merry Christmas," came a muffled voice through a bundle of scarves wrapped tightly around what must be Mary, his secretary.

"Merry Christmas, Mary, drive safely and enjoy your leave."

Col. Ebeneezer Alexander Ring watched quietly as the snow drifted peacefully down on his C-135 aircraft



Honorable Mention 1986 MAC Flight Safety Writing Contest

parked under the yellow floodlights. Continuing to stare into the dancing snow, he murmured, "Sure wish I had one more chance to talk with old Jacob. Surely do miss that damn Golden Touch."

RRRRRRRRiiiiinnnnnggggg!

The jangling receiver seemed to leap into his hand. Ebeneezer couldn't recall picking it up. The ringing continued. Suddenly, he recognized the origin of the sound: the crash phone.

"Colonel Ring here."

"Hi, Neezy, you ham-fisted tanker toad."

He flung the receiver into his "in" basket as he gasped for air; his skin flushed hotly, and the color drained from his face. The unmistakable voice of Lt. Col. Jacob "Golden Touch" Jones echoed in his head.

"Whose idea of a joke is this?" he asked, after retrieving the phone.

"It's no joke, Neezy. It's me, Jake."

"But Jake, I thought you were dead. The crash last year, the investigation, all the funerals. Jacob, the smell. Hell, I'll never forget the smell. How'd you get out of there?"

"Neezy, *I didn't.* Reported to the CINC at 2218:30Z as planned, on 2 Dec 84. But that's not why I'm here. I'm here on a mission from the CINC. Come with me, Neezy, step through the window and follow me. Let me show . . . ."

Traveling miles above and beyond the flightline, Colonel Ring was transported to a hill he was all too familiar with. The moonlight sparkled on the freshly fallen snow, everywhere except near the charred hull which once was 5-3535. Colonel Ring and Colonel Jones slid effortlessly over the sloping hillside towards the aircraft.

"Why are we here, 'Touch?' I've crawled all over this twisted shell. Hours of crawling and sweating until the smell of death permeated every inch of me. And for what? What the hell happened, Jake? I mean, 85 lousy feet and you would have made it."

"Look around you, Neezy. Not at the plane, you've seen plenty of it. Look over there. Yeah, by the trees."

Colonel Ring knelt slowly amidst the white trees heavy with snow, his flight boots squeaking on the frigid ground. As he picked up a handful of snow, he noticed—*hailstones.*

"I never noticed the hail, Jake."

"Neither did we. It was a good

TDY. Smooth mission, good shopping, and enough time to relax and enjoy the island. We were listening to some Christmas carols on the ADF as we ran checklists and prepared for the final approach. The nav asked if we saw anything ahead; you know, weather-wise. To tell the truth, Neezy, we'd been in and out of the soup so often I wasn't sure how far or what I could see. So I punched the button and said 'Don't worry, we've got the field.' We'd actually seen it a few minutes earlier. Kind of wished I'd been a little more accustomed to flying with the weather scanner.

"Anyhow, the next thing I know, I've got full right aileron, the left wing is still dropping, and the airspeed is falling like a wounded duck. After what seemed like a lifetime of cussing and sweating I got the wings level and the nose above the horizon when I heard the engineer cry out in pain. The guy broke three knuckles jamming those throttles forward. Damn fine bunch of boys we had there, Neezy. Real sorry about them, and your bird."

Colonel Ring scanned the all too familiar scenery. Black acrid smoke snaked upward from the smouldering wreckage. Unrecognizable shapes of friends sent clouds of sizzling steam into the crisp night. The memory permanently seared into his soul was the awful stench of charred entrails and roasted flesh.

"Come along, Colonel, it's time we move on." Jake placed his hand on the colonel's massive shoulder. The terrain began to pass in a green-brown blur. It rose and fell as they sped across the great expanse of the United States. The ocean appeared beneath their feet as they continued to accelerate across the sky to a lush tropical island.

Strangely enough, the descent occurred within a blink of an eye. The soft breeze carried the tart smell of salt mixed with the delicate aroma of tropical flowers. He instantly recognized Waikiki. How many bag drags have ended just like this? A boisterous bar, not enough rest or food, and maybe just a little more than too much to drink.

Colonel Ring noticed a raucous gaggle of crewdogs drinking a pitcher of Mai Tais. A tall, lanky fellow with no chin and blurry eyes, twirling a large set of car keys, stares blankly into his glass. Two others slump quietly in their chairs projecting the look of the terminally bored. A waitress kneels near the table clearing the remainder of the previous pitcher. Her eyes fix on a slight red welt on the cheek of one of the revelers who rises slowly from the leather seat, his face tied in a scowl. Colonel Ring cannot make out the conversation but the mood has definitely had a recent downshift. One by one, the now quiet quintet rise to their feet and head for the sunlit doorway. The man commanding the car keys leads, stumbling slightly over the thick entrance mat as he carefully balances his Mai Tai, map, and keys.

A twisted mass of crumpled steel lies pressed between the truck and the base of a tree.

"Where 'they heading, Jake?"

"Does it really matter, Neezy?" Jake asks as they watch the five guys crawl into the rental. The car jerks slowly away from the parking space and picks up speed as it meanders toward the on-ramp. Colonel Ring and Colonel Jacob drift above the auto watching its struggling efforts to remain between the dashed line on the left and the solid one on the right.

Fatigue arrives quickly; two of the men in the back slump down in a fitful sleep. It takes all the concentration Maj. Doug Miller can muster to split the difference between the lines. Had he been a little less tired or perhaps a little more sober he might notice how difficult it is to read road signs. He might realize that in order to read them he must whip his head to the side and speed-read as they accelerate down the highway. He might also notice the truck cresting the hill toward the five oblivious TDY bodies in the rental car. The two in the back seat never look up as the 32,000 pounds of chrome and steel approaches the blue Ford. Colonel Ring sees the truck, though his vision blurs. As they climb away from the scene, his own tears make it difficult to watch the car cartwheel back towards the ramp.

"Jake, what's going on?"

"These are your present problems: complacency, poor planning, and not knowing your limits. This accident doesn't have to happen, if your people can learn never to drop their guard."

Neezy looks down on the crash. A twisted mass of crumpled steel lies pressed between the truck and the base of a tree. Sliding down from the truck, a bearded man reluctantly hurries towards the blue mass. He grasps the handle and tugs mightily on the door. No luck. He tries again and again. Finally, he sags down against the side of the steel tomb and waits for the police and the paperwork. Another late delivery.

The airflow begins to slow as the pair descends once again. Beneath the night travelers appears a funeral procession; a very long one with four horse-drawn caissons following a riderless horse. A swell of people stand weeping, solemnly lining the streets. As far as Ebeneezer can see along the curbs and against the numerous shops, he sees friends, wives, husbands, and children of his people. Good people. People sharing a loss, bonded by unnecessary grief.

Hearing it for the first time, Colonel Ring hears the rhythmic squeak of the wooden wheels. He scarcely discerns the hushed monotone voice of a radio announcer coming through the side of a young boy's headphones: "—tragedies are, unfortunately, a part of military life. Thousands of people have lined Main Street

to bid farewell to the three brave men, led by Colonel Ebeneezer Ring, who lost their lives in a fiery explosion which . . . . "

Ebeneezer spins away from the boy. Facing his old friend, dozens of questions struggle to be first on his lips. Jacob places a hand on his shoulder and suddenly all his questions fade. Colonel Ring knows.

What a beautiful spring morning. Barely 0700 and already it's over 50°. We don't get many March mornings like this in Ohio. Better close this window and call for engine start, Colonel Ring thinks to himself. The finely trained crewmembers begin with a competence and authority which pumps pride into him. Step by step the two pilots and the flight engineer prepare the 180,000 pounds of flying machine for the local trainer.

"Test Radar, Agar 14. Taxi at 0715, should be in the area on time." Colonel Ring releases his mic button and shifts slightly in his seat.

"Roger 14, we'll be ready for you," Test Radar replies.

The EC-135 rolls onto the runway. The flight engineer sets the throttles and the aircraft accelerates down the 12,600 feet of concrete. What a great day to fly, he thinks to himself as he eases slowly back on the yoke, transforming the screaming tricycle into a flying machine.

"Gear up, Tom." Colonel Ring gestures with his right hand towards the gear knob. The vibrations in his feet tell him the gear is indeed moving up.

Out of the corner of his eye, he senses something. Too small to really see, yet he feels the presence. As he turns his head to the left, his stomach hardens with the acidic rush of fear. That tiny object has grown into a red and white single engine Cessna.

He forces the yoke down and hard right, the aircraft groans from the abrupt input. The big '135 doesn't respond quickly enough and becomes motionless between actions. At the same instant, the Cessna fights to counteract the laws of mass and momentum as it slides towards the larger target. The civilian pilot's face freezes with fear and astonishment; fear of the impending collision and astonishment at the sudden appearance of this huge mass of destruction. Just as the aircraft begin the nearly instantaneous fusion of metal, Colonel Ring notices the sweat glistening on the pilot's face.

In a single instance he knows this. He also knows that none of this has to be. He has the power to intervene in fate.

"Well, Neezy. It's time to return."

It all seems so unreal as he once again stands before his frosted window with the early morning winter sun peeking tentatively amidst the cloud cover. Activity picks up near the aircraft as maintenance troops begin preparing the planes for another full day of flying. He sniffs cautiously at his day-old flight suit and reaches for the phone.

"Cindy, set up a meeting with the two digits and the safety shop. I have an idea for a new awareness program I'd like to discuss with them."

Reaching for his hat he notices the photo of his old pal Jake Jones taken on the beach of Waikiki. Jake seemed to be smiling a bit more than Colonel Ring remembered. Surely, he thought, it's just a tired colonel's imagination.

As he walked toward the doorway and buttoned his coat, he noticed a nauseatingly pungent odor. An odor so distinctive, so indelibly ingrained in his memory . . . . "I wonder" he mumbled as he gazed into the breaking day. With the beginnings of a safety awareness program forming in his mind, he stepped into a new day, which somehow seemed brighter and more real. A slight smile tugs at the corner of his mouth, "Thanks, Jake" he whispered almost inaudibly.

Author's Note:

"My sincere apologies to Mr. Charles Dickens for having the idea first and better. May his revolutions soon stop."

Capt. Keith A. Quinn graduated from the AF Academy in 1974, completed UNT at Mather AFB, CA. and flew KC-135Qs at Beale AFB, CA. From there, Captain Quinn flew with the 46 AREFS at K.I. Sawyer AFB, MI. Captain Quinn is currently flying C-135s and serving as Chief, Air Operations, for the 4950th Test Wing at Wright Patterson AFB, Ohio.

Beware your cargo . . .

INVISIBLE KILLERS

"Flaps up."

"Flaps and slats, up and retracted."

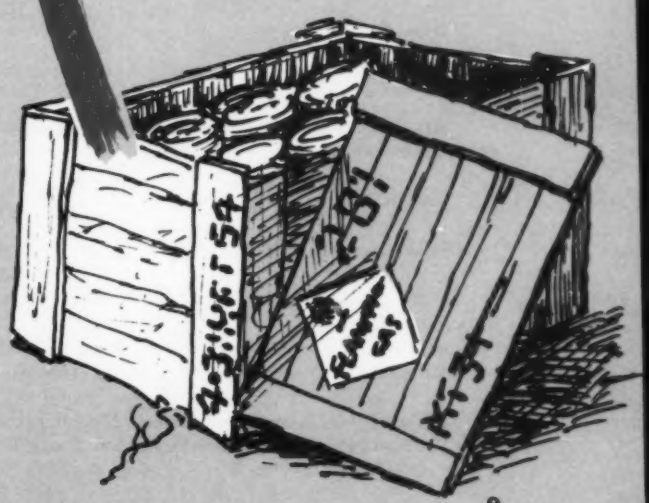
"Roger. After-takeoff climb check. Climb power, engineer. Scanner, you're cleared off for your walk-around."

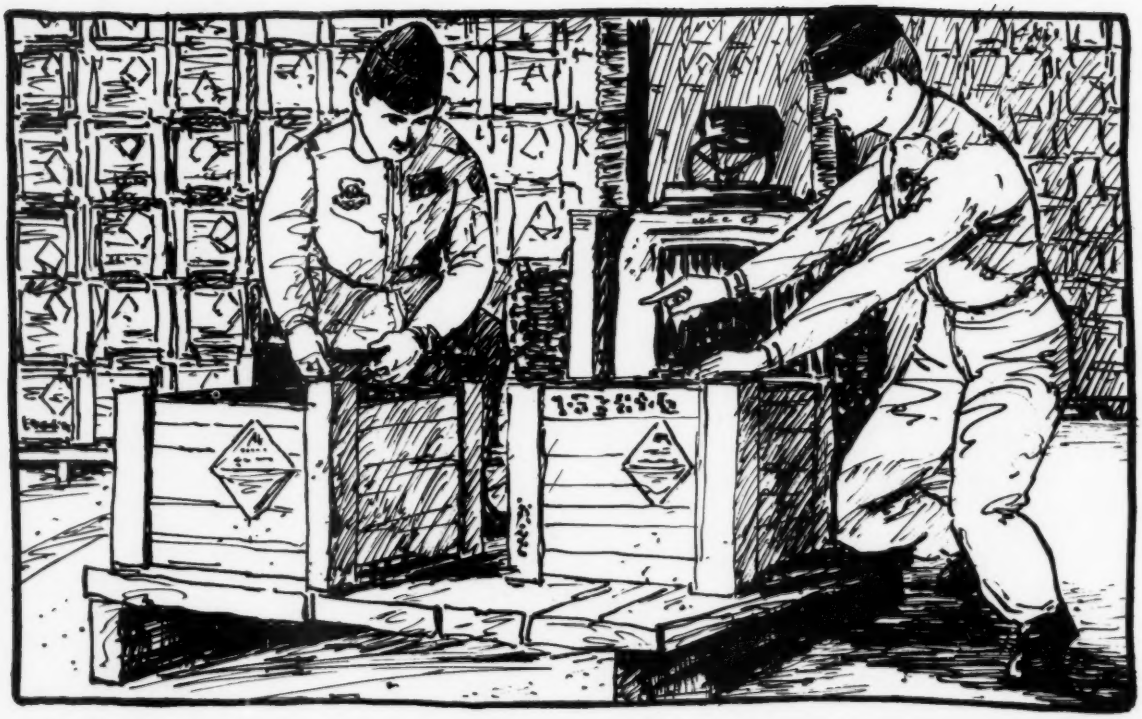
"Roger, sir. On my way."

"MAC 96340, climb to flight level one-eight-zero. Report leaving one-four thousand."

"Roger, New York. MAC 96340 leaving six thousand for flight level one-eight-zero. We'll report passing one-four thousand."

"Pilot, scanner."





"Go ahead, scanner."

"Sir, we have a little fluid coming out of one of these rocket motor containers. I have a rag and I'll wipe it up. It doesn't smell bad or anything."

"Scanner, put your smoke mask on. Crew, don oxygen masks, 100 percent oxygen. Smoke and fume elimination checklist. Aft flight deck, drop the masks in the troop compartment."

"Aw, I'm almost done, sir. I'll get it in a second."

"Now, scanner!"

"I . . . whew, getting a little dizzy. I'm going . . . ."

"Aft flight deck, check on the scanner, and keep the smoke mask on."

"Yes sir."

"Looks like he fainted, sir."

"Okay, get a smoke mask on him. Co, get a clearance back to base and declare an emergency. Engineer, call the command post and tell them to have an ambulance standing by to meet the airplane when we clear the runway . . . ."

"Hello, Major Hobson, I'm Captain Mac MacKenzie from the Numbered Air Force safety office. I was in the command post when you declared the emergency. How's your scanner doing?"

"Well, the flight surgeon said he'll be okay. He'll just be in the hospital overnight. It looks like he had a pretty strong reaction to the fumes that stuff generated. What is that stuff, anyway?"

"C'mon over to the office. We'll have a cup of coffee and talk it over."

"Cargo spills have been a problem for a long time but they seem to be on an upswing lately. I've been doing some research to pass to my safety officers. We're not sure yet what it was that hit your scanner, but aniline is one possibility. It's a substance used in some liquid propellant mixtures. It has a pleasant, non-irritating odor, but it is dangerous. You can absorb the fumes through the lungs and skin. It causes shortness of breath, weakness, dizziness, diarrhea, muscular incoordination and mental confusion."

"Sounds like great stuff. What else have you found out?"

"Well, there's a whole group of nasty materials out there just waiting to bite us. Liquid oxygen, nitric acid, and hydrogen peroxide are all used as oxidizers in various liquid propellants. Nitric acid and hydrogen peroxide cause severe burning on contact with the skin. Their vapors can cause marked irritation of your eyes and respiratory tract.

Obviously, the hydrogen peroxide used is much more concentrated than the diluted hydrogen peroxide you buy at the drugstore."

"We actually carry stuff like that?"

"Once in a while, but our procedures and safeguards normally keep us safe. Our greatest hazard is from more mundane substances. For example, the toxic effects of exposure to the products of a fire in an aircraft are pretty complex. During a fire, it's common for oxidation of the various materials involved to be incomplete, principally producing carbon monoxide, aldehydes, various other breakdown products, depending on the material, and some carbon dioxide and water vapor. The aldehydes are irritating, so you'll recognize their presence pretty quickly. Carbon monoxide, though, is much more insidious. A concentration of just .01 percent, which would be safe on the ground, reduces the oxygenation of arterial blood by 10.5 percent. Superimpose this on the reduced arterial oxygen saturation at a cabin altitude of 10,000 feet and you're likely to end up with hypoxia, especially if you're a smoker. That's why you should leave the airplane or go on 100 percent oxygen when you're loading vehicles. You can imagine the effect an in-flight fire can have."

"I've read some articles about the plastics used in airplanes and the problems they can cause if they burn. Has anyone found a solution yet?"

"No. There's a lot of research underway to 'fireproof' seat cushions and such, but plastic is used in a lot of areas; wire insulation for example. Most plastics are inert at normal temperatures, but when burned or heated, their breakdown products can be toxic. They irritate the lungs and damage the central nervous system if the concentration is high enough."

"That's *real* encouraging. What other materials do we have to worry about?"

"Well, at one time, hydraulic fluids had a castor oil base which contained a mixture of volatile compounds and were flammable, but most of them now have a mineral base and are not volatile so their vapors aren't toxic. However, hydraulic fluids are usually under high pressure and a ruptured line can cause a fine spray which can be ingested in droplet form. This is likely to cause mild irritation of the eyes and respiratory passages with some nausea and anesthesia. The needle-like spray is hazardous in itself. You can end up with an injection of hydraulic fluid if you aren't careful."

"At least that's not as bad as central nervous system damage."

"No, it's not, but other materials can cook up some nasty stuff too. The chemicals in fire extinguishers, such as carbon tetrachloride and chlorobromomethane both degrade to phosgene gas when heated. Phosgene is particularly nasty as it can cause respiratory collapse at very low concentrations. Monobromotrifluoromethane is a newer liquid fire extinguisher which is virtually non-toxic, but it produces bromine and fluorine when burned."

"I thought we were converting to HALON fire extinguishers?"

"HALON 1211, to be exact. HALON has low toxicity but even its decomposition products are hazardous. It has a sharp, acrid odor. If you ever need to use it, ventilate the airplane ASAP."

"I had an air conditioning pack overheat once. Evidently some of the lubricating oil burnt before it was over. What menace does that present?"

"Well, lubricating oils can break down into aldehydes, which irritate the upper respiratory tract. Another substance used on our airplanes which can be bothersome is de-icing fluid, used either as a windscreen or external de-icer. These fluids usually consist of various mixtures of ethyl or methyl alcohol, propylene or ethylene glycol and water. They're not too toxic unless you're subjected to a high concentration, but they may cause irritation of the eyes and nose along with possible headache and nausea. The symptoms usually aren't too severe, but irritation of the eyes can cause them to water, making it pretty tough to see your instruments clearly."

"I was on a relief mission a couple of months ago, carrying chemicals to fight a grasshopper infestation. I didn't recognize some of the stuff we were carrying. What about that?"

"Insecticides, herbicides, and other agricultural chemicals are very hazardous. They can gain access to the body through the skin, lungs, or gastrointestinal tract and their actions vary according to the dose and chemical composition. The symptoms can be severe, so they have to be handled very carefully. Accidental contamination calls for immediate, expert medical treatment."

"Makes you wonder about everything we carry."

"Fortunately, instances like what happened to your scanner are rare. The main thing to remember is to suspect any unusual smell as being hazardous. That means going on 100 percent oxygen and using goggles or smoke masks. Also, keep your flightsuit sleeves down and maybe even put your gloves on to protect bare skin. Anything that burns will give off carbon monoxide, so ventilate the airplane thoroughly before you remove your mask. The last thing to keep in mind is that not all toxic hazards are irritating. That's what happened today. Just because it doesn't smell bad doesn't mean it can't hurt you.

"But, enough of such depressing talk. Let's check and see how your scanner's doing and then we'll see if the wing safety folks have found out what that stuff was." ✈

Mishap With A Moral

A routine tour turned into the . . .

GRAND CANYON

Tragedy

The morning of 17 August 1983 started out much like any other for the pilot of Las Vegas Airlines Flight 88 (N88LV). The pilot appeared well-rested as he prepared to fly a group of sightseers from North Las Vegas Airport, through the Grand Canyon, to Grand Canyon National Park Airport, Tusayan, Arizona. However, what actually happened that day taught a gruesome lesson about mission demands, personal limits, and the consequences of encountering IMC while flying low-level, using visual flight rules.

History of Flight

Las Vegas 88 was one of five Grand Canyon sightseeing aircraft operated by Las Vegas Airlines flying that day (Las Vegas 33 and 19 were scheduled to fly the same basic route as Las Vegas 88.) Preflight planning was normal and in accordance with company policy. Las Vegas 88 departed North Las Vegas Airport at 1142 local time with the pilot and nine passengers aboard.

At 1143L, the pilot of Las Vegas 88 contacted Las Vegas Departure Control (IAW Group II, Terminal Control Area procedures). After clearing the TCA at 1148, Las Vegas 88 contacted Las Vegas Flight Service Station (FSS) to activate his pre-filed VFR flight plan. The conversation consisted of the following:

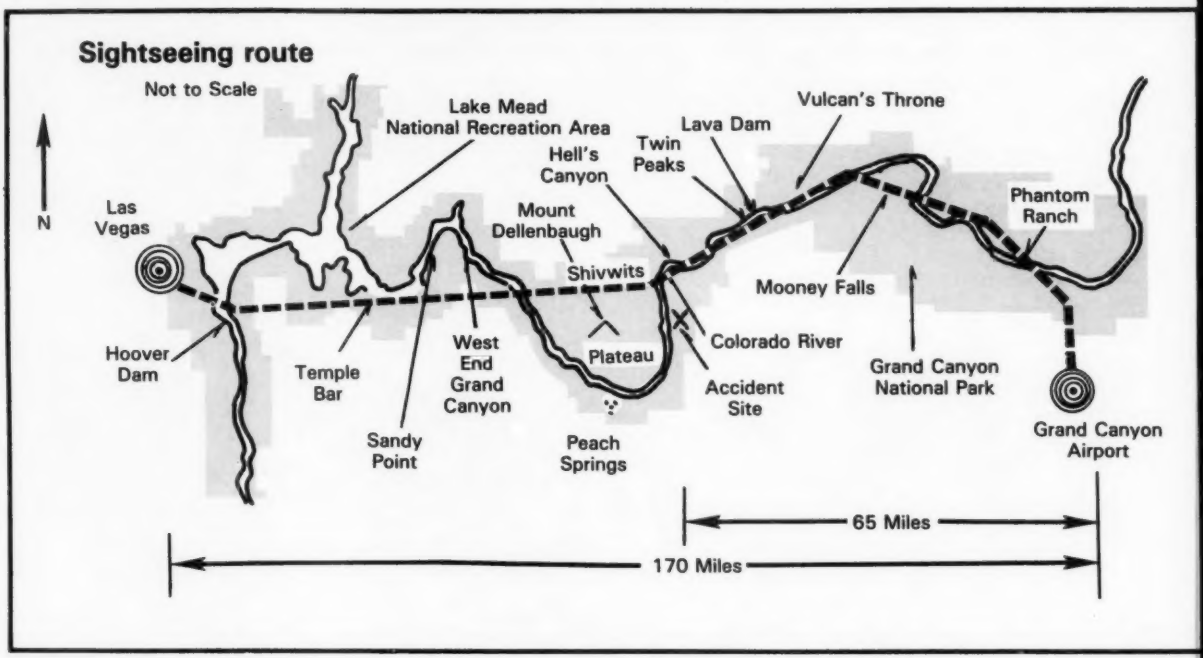
Las Vegas 88: "Vegas 88 to open a one-way flight plan to the Grand Canyon, Gustafson, ten souls on board, airborne at four three."

FSS: "Las Vegas 88, flight plan activated and be advised, sir, there has been a convective SIGMET issued now for Arizona, basically from Needles to Prescott, southbound to sixty miles southeast, correction, sixty miles east of Prescott, areas of embedded thunderstorms moving from the south at one five knots, maximum tops three eight thousand feet, cells will move northwesterly at one five knots. Air Cortez just departed a few minutes ago and they were unable to maintain VFR conditions below clouds. They broke up at, correction, they broke out at one one thousand five hundred feet and that position where they broke out was six zero miles east of the Las Vegas area, sir."

Las Vegas 88: "Thank you very much."

Las Vegas 88 proceeded en route and the pilot made no further contact with any other ATC facility.

Las Vegas Airlines flights are normally conducted under VFR. The preferred tour itinerary was to fly south over the Las Vegas Strip, then easterly over Hoover Dam, on to Lake Mead, and across the Shivwits Plateau, over the Grand Canyon rim. At this point, the flights normally descended into the Canyon where they followed the Colorado River to the Grand Canyon National Park Airport (see Figure 1). The flight routes are not fixed since the pilots may deviate to maintain VMC. In this area, the width of the Canyon varies from about 4 to 15 miles and the elevation of the rim varies from about 6,300 feet to 8,000 feet. Return flights from Grand Canyon Airport to North Las Vegas Airport were normally flown direct, at altitudes in excess of 10,000 feet.



The pilots of Las Vegas 88, 33, and 19 all communicated on a prebriefed, discrete frequency as they flew toward the canyon. The pilot of Las Vegas 33 stated that Las Vegas 88 passed two miles to the right and about 1,000 feet above his airplane, just east of Temple Bar, Arizona. Las Vegas 88 then reported to company traffic he was passing over Sandy Point, Arizona, and was proceeding northbound to avoid a rain shower located just south of the west end of the Grand Canyon. Shortly afterwards, Las Vegas 88 reported entering the Canyon west of Shivwits Plateau. This transmission was followed by an exchange between Las Vegas 33 and Las Vegas 88 regarding whether or not the weather was good enough for them to cross the south end of Shivwits Plateau. Las Vegas 88 responded that the weather looked bad to the north (on the Shivwits) and he was heading south to the Colorado River. Las Vegas 88 then began referencing his position, in terms of radials off the Peach Springs VORTAC, while flying at 5,000 feet. Later, the pilot of Las Vegas 19, who heard these transmissions, estimated the position of Las Vegas 88 to be in the Canyon, between Peach Springs and Mount Dellenbaugh. Then, both Las Vegas 33 and Las Vegas 19 heard the pilot of Las Vegas 88 report he was just short of Twin Peaks, but couldn't see either of the other aircraft yet. The Last transmission from Las Vegas 88 heard by the other Las Vegas Airlines pilots was, "It's getting too bad in here. I'm getting out." Las Vegas 33 attempted twice to contact Las Vegas 88 to suggest he proceed north of Mount Dellenbaugh; however, there was no response to either call.

The pilot of Las Vegas 33 elected not to enter the canyon. Instead, he turned back to the west, climbed to 9,500 feet, and headed northwest over Shivwits Plateau. Next, he turned east and proceeded to a position north of Mount Dellenbaugh. Here he turned east, descended into the Canyon, and continued the tour.

The pilot of Las Vegas 19 stated he was flying ahead of Las Vegas 88, north in the Canyon, but south of Twin Peaks about the same time that Las Vegas 88 called he was in the vicinity of Twin Peaks. The pilot of Las Vegas 19 also said the cloud cover ahead of him precluded VFR flight so he climbed in VMC between layers of clouds to 9,000 feet and flew east about 10 miles before reentering the canyon, east of Twin Peaks.

Las Vegas 88 crashed at about 1227L, at coordinates 36°59'50"N and 113°17'15"W at an altitude of 6,320 feet. The next day, two company pilots, flying a search mission, found the wreckage of Las Vegas 88 on the west side of a mesa inside the Grand Canyon—there were no survivors.

The Airplane

The airplane was certificated and maintained in accordance with approved FAA procedures. There was no evidence of pre-accident failure or malfunction of the airplane's structure, powerplants, or systems. There was no evidence of in-flight fire. However, evidence indicated a post-impact flash fire in the main wreckage.

A review of maintenance records indicated both altimeters on N88LV were replaced on 15 August 1983, in compliance with FAA requirements. The altitude encoder was also replaced at that time; however, as of 17 August 1983, the encoder had not been calibrated with the transponder on board N88LV. Because of this, Las Vegas Airline operating procedures restricted N88LV to VMC flight only. However, lack of calibration of the encoder with the transponder wouldn't have affected the accuracy of the newly installed and checked altimeters.

The Pilot

A review of the pilot's flight and medical certificates, flight log, and training records indicated he was properly certificated and had received the training and off-duty time prescribed by Federal regulations. He'd been employed by Las Vegas Airlines since April 1980 and had amassed continuous experience flying the Grand Canyon tour. Additionally, the pilot was a retired USAF fighter pilot whose total flying time exceeded 8,000 hours.

According to other company pilots, he appeared normal and rested before the flight. Due to his experience flying the Grand Canyon tour, the Safety Board concluded the pilot was familiar with the geographical landmarks around the Canyon.

The Weather

On 17 August, the weather in the Las Vegas area was above VFR minimums all day and none of the departing or arriving Las Vegas Airlines flights reported difficulty maintaining visual conditions. The weather at Grand Canyon Airport was well above VFR minimums before the accident. About 48 minutes after the accident, the cloud ceiling at Grand Canyon Airport lowered to 400 feet and 1 mile visibility with light rain and fog. However, this condition cleared rapidly and VMC prevailed for the remainder of the day.

The 1230 weather report for 17 August indicates the area of the accident site was on the northern edge of a cloud system containing scattered light and a few moderate rain showers. The SIGMETs in effect were for areas about 100 miles south of the Las Vegas Airlines Grand Canyon route and would have had no effect on the mishap aircraft. The 1100 weather forecast for the Grand Canyon was: 5,000 feet scattered; 10,000 feet broken, scattered variable broken; chance of 4,000 feet broken; 5 miles visibility in thunderstorms with moderate rain showers or just moderate rain showers; wind gusts to 35 Knots until 2200 hours. This forecast was essentially correct. There is *no* history of below VFR minimum conditions during the summer months at either the Las Vegas or nearby Flagstaff airports. Likewise, there is no history of below IFR minimum conditions at Grand Canyon National Park Airport during the same time of year. Indeed, weather around the Canyon area during the summer months is characterized by VMC. Consequently, the pilot of Las Vegas 88 probably didn't anticipate he would be unable to complete the Canyon portion of the flight in visual conditions and successfully land at Grand Canyon National Park Airport in either visual or instrument conditions.

Safety Board investigators were unable to find evidence the pilot had received a personal weather briefing before takeoff; however, the pilot may have obtained a recorded weather briefing by telephone from the Flight Service Station and he *did* receive the SIGMET from Flight Service after takeoff.

The pilot of Las Vegas 19, who was in the Canyon ahead of Las Vegas 88, stated that he climbed, VMC, between layers, to 9,000 feet because the cloud cover in the Canyon prevented visual flight south of Twin Peaks. Additionally, a helicopter pilot, flying 14 miles north of the accident site, stated that, "clouds were . . . rolling around at ground level . . . 4,500 feet" southwest of his position, at about 1230L. These clouds may have been those encountered by Las Vegas 88 which prompted his decision to abort the flight since clouds at 4,500 feet would obscure both rims of the Canyon.

Effects of Limited Visibility

Shortly before his last transmission, the pilot of Las Vegas 88 indicated he was "just short of Twin Peaks." However, according to the pilot of Las Vegas 19, the radials called off by the pilot of Las Vegas 88 would have placed the airplane in the Canyon between Peach Springs and Mount Dellenbaugh. Las Vegas Airlines pilots stated that bluff formations near the accident site resemble Twin Peaks, which is upriver, about 20 miles northeast of the accident site. Since the rim was obscured, the pilot of Las Vegas 88 couldn't confirm his position. Had the pilot *actually* been in the area of Twin Peaks when he encountered the lowering clouds, the flight path he selected to climb out of the Canyon probably would have enabled the airplane to clear the rim.

Probable Cause

The National Transportation Safety Board concluded the probable cause of this accident to be the pilot's failure to maintain adequate visual flight references to positively identify his position while flying below the rim of the Grand Canyon. This resulted in the pilot's selection of an inappropriate flight path and subsequent collision with the terrain during an attempt to climb, in instrument meteorological conditions, to a safe altitude above the rim of the Canyon.

Application to MAC

Though MAC crews aren't tasked to provide sightseeing tours of the Grand Canyon, the moral of this mishap should be clear. MAC's tactical aircraft and crews *routinely* operate at low level. Like the ill-fated Las Vegas 88, it's easy to find ourselves "hacking" the mission to the point where we extend beyond our personal, or the aircraft's, performance limits. We must constantly be aware of potential weather hazards and *never* take it for granted that simply because one type of hazardous weather pattern isn't *typical* of a particular area, it *can't* or *won't* occur.

This mishap also highlights the dangers of complacency. Remember the old saying "familiarity breeds contempt"? Perhaps getting *too* comfortable with any routine, whether it's flying the tour route through the Grand Canyon or doing something as familiar as taxiing to parking at home drome, can be dangerous if we believe that *nothing* can go wrong.

Finally, for all aviators, this mishap points out the necessity for situational awareness. Crews should *always* be asking themselves "what if" questions. What if you pop over the ridge line into a fog bank; where are you and how do you escape? What if you *don't* break out on that ILS approach? Are you *really prepared* to fly the published missed approach?

Adapted From NTSB/AAR-84/06

Flying-Hour Milestones

10,000

Lt Col Donald L. Denomme, 711 SOS
Lt Col Donald L. Smith, 313 MAS
Lt Col Gifford G. Tures, 815 WRS
MSgt Hilliard A. Fulgham, 815 WRS
MSgt William L. Grunert, 729 MAS
MSgt William K. Hawthorne, Jr., 315 MAW

5,000

Lt Col Charles D. Burnfield, 145 TAG
Lt Col Charles E. Burnham, 172 MAG
Lt Col Dale A. Davidson, Det 1, 1401 MAS/CC
Lt Col Benjamin F. Hall, 815 WRS
Lt Col Jasper E. Patterson, 185 TAS
Maj Gary C. Ahrenholz, 21 TAS
Maj Robert R. Buckhout, 731 TAS
Maj Gerald A. Cavanah, 919 SOG
Maj Robert L. Dahmer, 328 TAS
Maj Pickens N. Freeman, 145 TAG
Maj Walter F. Holloway, 711 SOS
Maj James E. Jones, III., 919 SOG
Maj James H. Kling, 313 MAS
Maj Robert T. Martens, 337 TAS
Maj Richard A. Morgan, 54 WRS
Maj James A. O'Connell, 21 TAS
Maj Jerry R. Porter, 919 SOG
Maj Stephen D. Rowe, 711 SOS
Maj Ronnie L. Tapp, 711 SOS
Maj John H. Taylor, Jr., 731 TAS
Maj Frank E. Walters, 22 MAS
Capt James E. Glenn, 731 TAS
Capt Michael Rosenbaum, 313 MAS
CMSgt Donald W. Deshan, 313 MAS
SMSgt Marion M. Terry, Jr., 40 TAS
MSgt Stanley Abramson, 69 AES
MSgt Frank W. Brewer, 172 MAG
MSgt William F. Ettel, 313 MAS
MSgt Frank A. Ferriera, 815 WRS
MSgt Ray A. Houck, 56 MAS
MSgt John E. Hurtin, 313 MAS
MSgt Burton E. Lesser, 41 TAS
MSgt Mark E. Raymond, 22 MAS
MSgt Michael J. Shea, 21 TAS
TSgt James S. Caron, 313 MAS
TSgt Juan R. Joy, 41 MAS
SSgt Quentin G. Anderson, 772 TAS
SSgt Michael F. Pluff, 772 TAS

2,500

Maj Robert F. Reinert, Det 5, 37 ARRS

Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award.

Don't be one of the few . . .

Taxi (OOPS) Mishaps

Aircraft impacts light pole taxiing to parking—wing fire; left wing strikes stepvan; right wingtip collides with light pole; right wingtip violently contacts light pole; left wingtip clobbers parked aircraft; left wingtip lambasts building; aircraft thrashes fire extinguisher during taxi. Sound unreal? Not to the people involved.

Taxi mishaps are expensive (and embarrassing) occurrences that are almost 100% preventable. Most happen due to a combination of the limits of the human eye and crewmembers "pressing" to accomplish the mission without delay.

Trying to do something about taxi mishaps calls for a three-step approach. The first step (as in everything we do) is planning. For crewmembers, this entails thorough examination of airfield diagrams, the IFR Supplement, and NOTAMS for your destination and alternate. For safety officers, especially when deployed as exercise safety officers, it involves developing parking plans according to applicable directives. These directives include MACR 55-25 and AFR 60-11. Thorough measuring and surveying is a necessity to identify or remove any potentially hazardous obstacles.

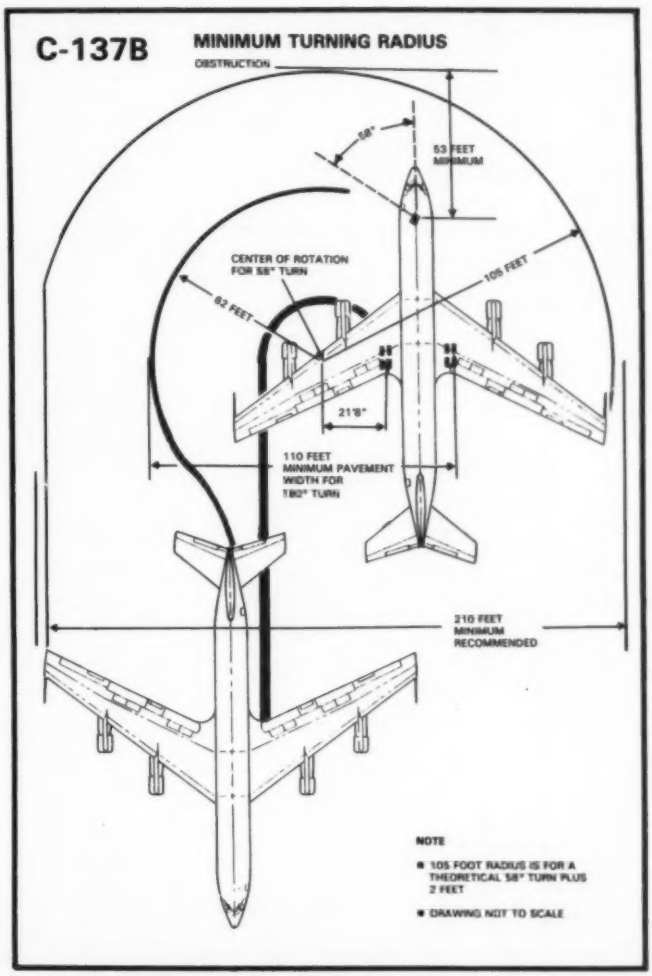
The second is to understand just how limited our vision is in judging distance and detail. The human eye is not capable of accurate depth perception when an object is beyond about 6 meters (18.5 feet). For example, the wingtip of a C-5 is approximately 165 feet from your position near the cockpit window. But, what the observer sees in the window is not the wingtip but a point about 8 feet inside the wingtip. Some crewmembers use reference points on the outboard engines or the landing lights to judge location of the wingtip. However, these references are invalidated when the airplane starts to turn. The wingtip on a C-5 "grows" approximately 10 feet during the first 30-40° of a fully castered minimum radius turn. Ten feet? There goes your minimum obstacle clearance with a marshaller. The horizontal stabilizer tracks up to 18.5 feet outside the wingtip in a fully castered, minimum radius turn. Now you're getting close to the 25-foot clearance allowed without a marshaller. Put these facts together with the limits of your eyeball and a rapidly moving wingtip or T-tail, and a taxi mishap may be just moments away.

The third step to preventing taxi mishaps is obvious but probably not done often enough. Put somebody on the ground to check your clearances. Groundcrews and marshallers may not be fully cognizant of just how much your airplane will "grow."

If you have any doubt about clearances or taxi routes to or away from the parking spot: *ASK!*

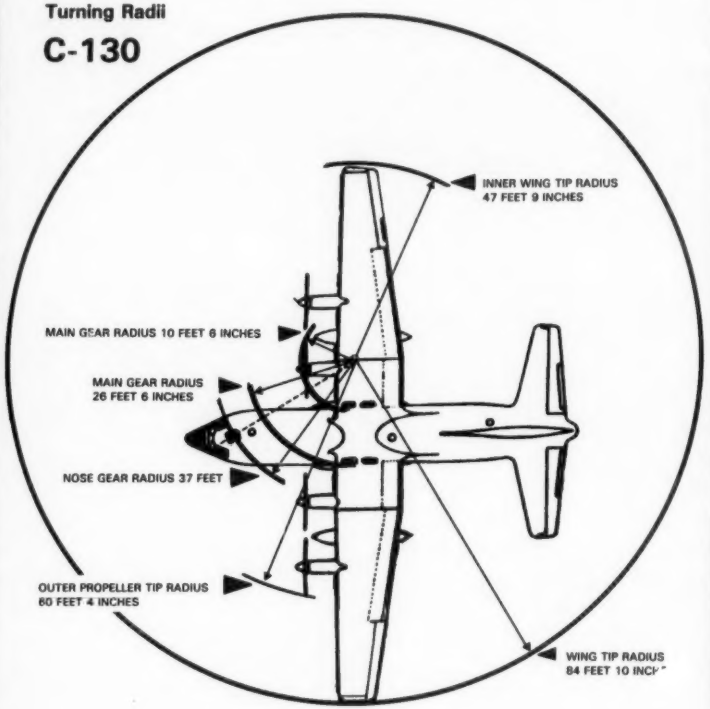
Preventing taxi mishaps, like everything else we do, is a team effort. We want to move the mission and the groundcrew wants to give us the best service possible.

To help refresh your memory, we've printed some turn radius diagrams for you to peruse. A little study now could pay off later.



Turning Radii

C-130


INNER WING TIP RADIUS
47 FEET 9 INCHES
MAIN GEAR RADIUS 10 FEET 6 INCHES
MAIN GEAR RADIUS
26 FEET 6 INCHES
NOSE GEAR RADIUS 37 FEET
OUTER PROPELLER TIP RADIUS
80 FEET 4 INCHES
WING TIP RADIUS
84 FEET 10 INCH

VERTICAL CLEARANCES

WING TIP	12 FEET
VERTICAL STABILIZER TIP	38 FEET 2 INCHES
INBOUND PROPELLER	5 FEET 9 INCHES
OUTBOARD PROPELLER	6 FEET 5 INCHES

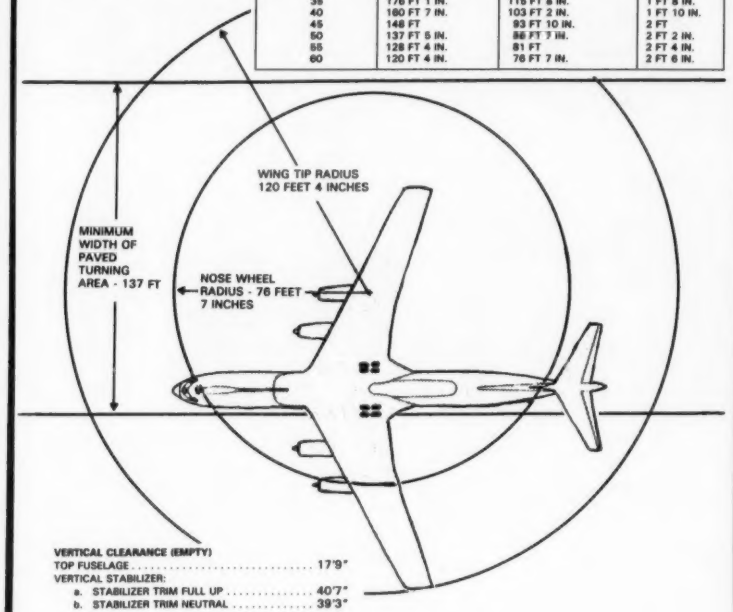
CAUTION

MINIMUM SPACE REQUIRED FOR TURNING IS 169 FEET 8 INCHES WITH THE NOSE GEAR TURNED TO THE MAXIMUM OF 60 DEGREES

TURNING RADIUS AND GROUND CLEARANCE

C-141B

NOSE GEAR TURN IN DEGREES	WING TIP RADIUS	NOSE WHEEL RADIUS	WING TIP GROWTH
30	196 FT 1 IN.	132 FT 8 IN.	1 FT 6 IN.
35	176 FT 1 IN.	115 FT 8 IN.	1 FT 8 IN.
40	160 FT 7 IN.	103 FT 2 IN.	1 FT 10 IN.
45	148 FT	93 FT 10 IN.	2 FT
50	137 FT 5 IN.	86 FT 7 IN.	2 FT 2 IN.
55	128 FT 4 IN.	81 FT	2 FT 4 IN.
60	120 FT 4 IN.	76 FT 7 IN.	2 FT 6 IN.



VERTICAL CLEARANCE (EMPTY)

TOP FUSELAGE ..... 17'9"
VERTICAL STABILIZER:
a. STABILIZER TRIM FULL UP ..... 40'7"
b. STABILIZER TRIM NEUTRAL ..... 39'3"

MINIMUM GROUND CLEARANCE	CONDITIONS AND CLEARANCE	
	FULL FUEL LOAD AND MAX AIRCRAFT GROSS WT	EMPTY AIRCRAFT
	MANEUVER LOAD FACTOR 1.0g	MANEUVER LOAD FACTOR 1.0g
WING TIP	8'9"	11'
OUTBOARD NACELLE	3'9"	4'5"
LOWEST POINT OF FUSELAGE (VHF #1 ANTENNA)	8.5"	

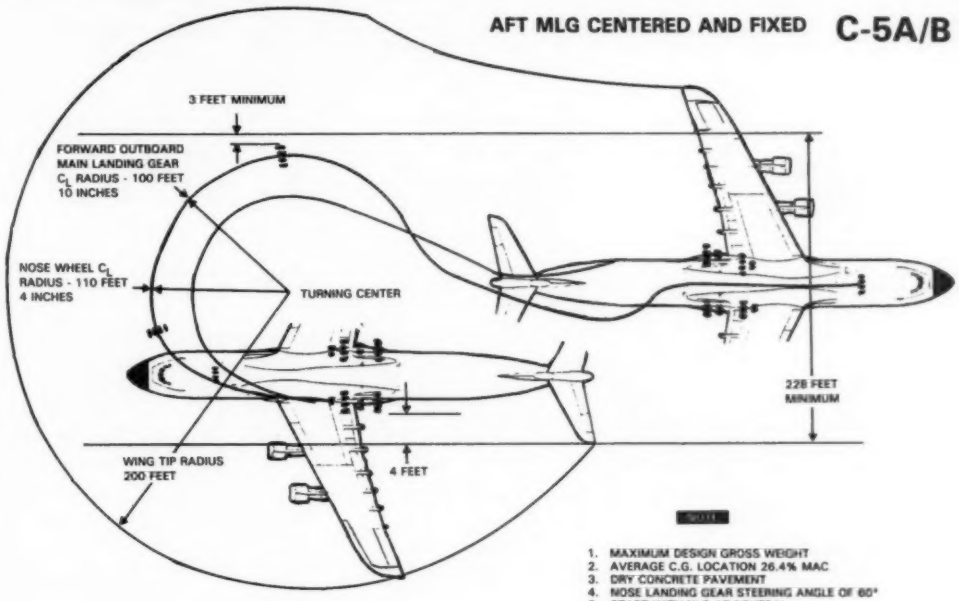
WARNING

Maximum nose wheel deflection is restricted, by stops, to 60 degrees left or right. Forcing nose wheel steering past the 60 degree stops may result in complete loss of nose wheel steering

CAUTION

Outboard wing tip on sweptwing aircraft "grows" in turns. Deplane Scanner to act as wing walker when clearance is questionable.

AFT MLG CENTERED AND FIXED C-5A/B


3 FEET MINIMUM
FORWARD OUTBOARD MAIN LANDING GEAR C_L RADIUS - 100 FEET 10 INCHES
NOSE WHEEL C_L RADIUS - 110 FEET 4 INCHES
TURNING CENTER
228 FEET MINIMUM
WING TIP RADIUS 200 FEET
4 FEET

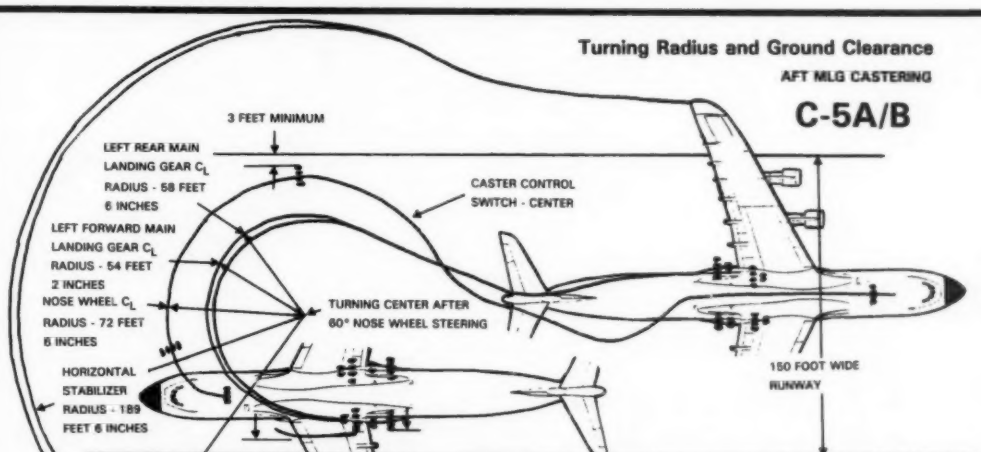
NOTE

1. MAXIMUM DESIGN GROSS WEIGHT
2. AVERAGE C.G. LOCATION 26.4% MAC
3. DRY CONCRETE PAVEMENT
4. NOSE LANDING GEAR STEERING ANGLE OF 60°
5. START WITH NLG AT NEUTRAL
6. SYMMETRICAL THRUST
7. TAXI TURN SPEED 4 KNOTS

Turning Radius and Ground Clearance

AFT MLG CASTERING

C-5A/B


3 FEET MINIMUM
LEFT REAR MAIN LANDING GEAR C_L RADIUS - 58 FEET 6 INCHES
LEFT FORWARD MAIN LANDING GEAR C_L RADIUS - 54 FEET 2 INCHES
NOSE WHEEL C_L RADIUS - 72 FEET 6 INCHES
HORIZONTAL STABILIZER RADIUS - 189 FEET 6 INCHES
WING TIP RADIUS - 171 FEET
4 FEET
7 FEET
CASTER CONTROL SWITCH - CENTER
TURNING CENTER AFTER 60° NOSE WHEEL STEERING
150 FOOT WIDE RUNWAY
LEFT REAR MAIN LANDING GEAR OUTBOARD WHEEL -84 FEET

NOTE

1. MAXIMUM DESIGN GROSS WEIGHT
2. AVERAGE C. G. LOCATION 26.4% MAC
3. DRY CONCRETE PAVEMENT
4. NOSE LANDING GEAR STEERING ANGLE OF 60°
5. TAXI TURN SPEED 4 KNOTS
6. ASYMMETRICAL THRUST
7. AFT MAIN LANDING GEAR CASTERING SELECTED PRIOR TO STARTING THE TURN
8. THE TURNING CENTER PIVOT POINT IS LOCATED MID-POINT BETWEEN THE ENGINES PARALLEL WITH THE FORWARD EDGE OF THE OUTBOARD ENGINE.

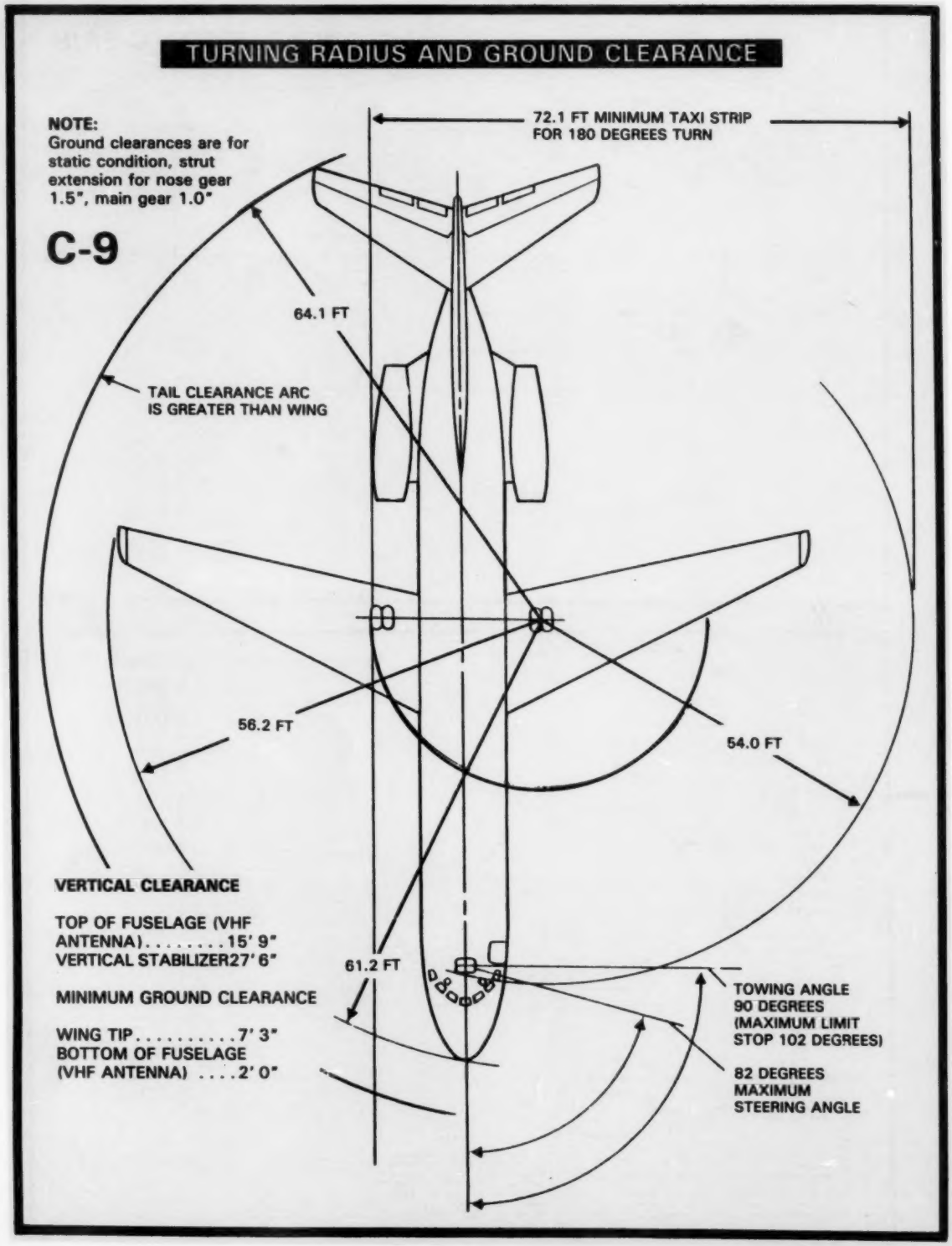
CAUTION

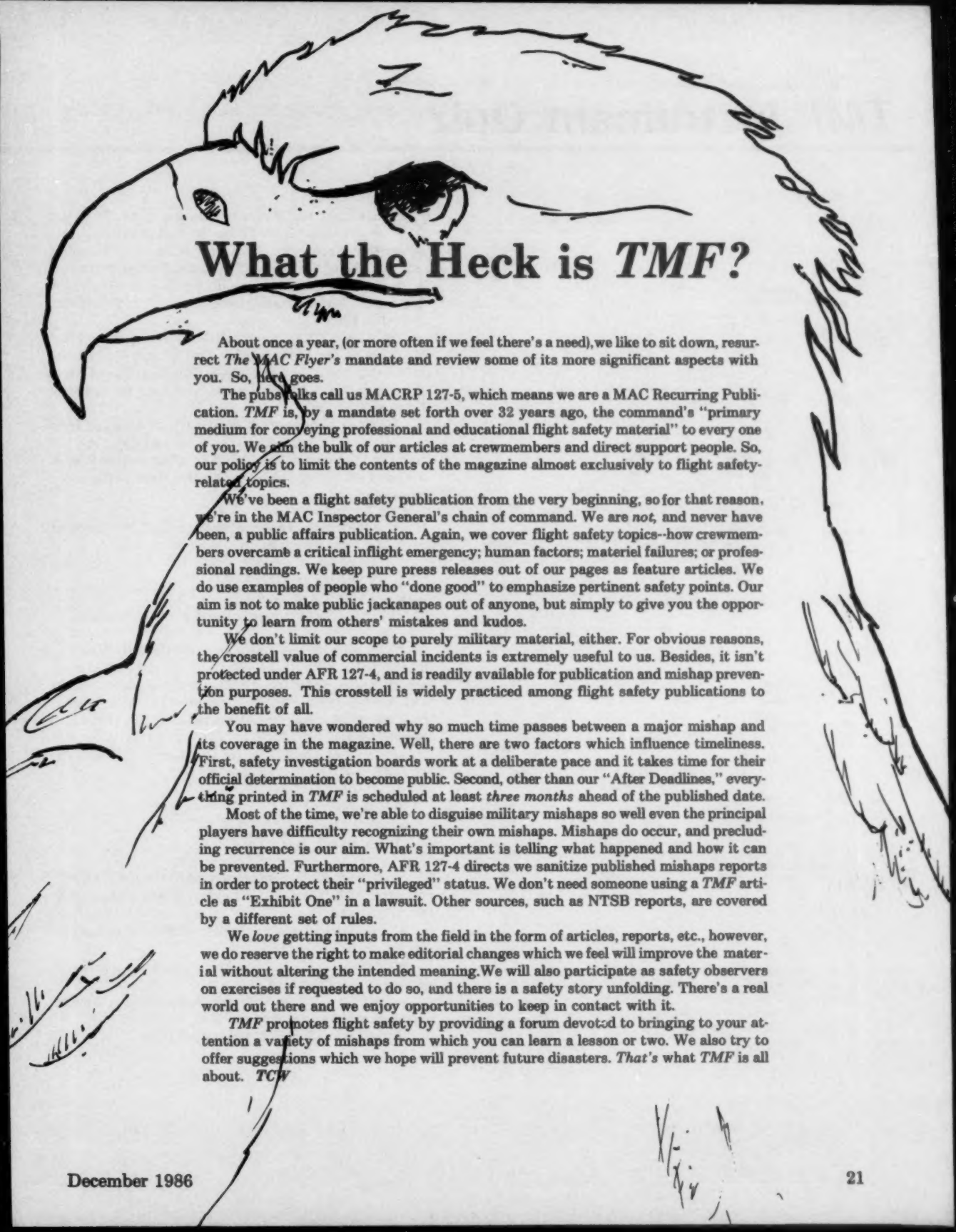
AT TAXI WEIGHTS LESS THAN MAXIMUM GROSS WEIGHT, ON A WET RUNWAY WITH 60° NOSEWHEEL STEERING, MAXIMUM INPUT RATE, MAXIMUM TAXI TURN SPEED, DIFFERENTIAL BRAKING AND ASYMMETRICAL THRUST, THE STABILIZER TIP RADIUS MAY INCREASE BY AS MUCH AS 5 FEET.

VERTICAL CLEARANCE (MAXIMUM GROSS WEIGHT)

TOP OF FUSELAGE	30 FEET 8 INCHES
VERTICAL STABILIZER (0° TRIM)	65 FEET 1 INCH

MINIMUM GROUND CLEARANCE	FULL FUEL LOAD AND MAX AIRCRAFT GROSS WEIGHT. MANEUVER LOAD FACTOR =1.0g
WING TIP	13 FEET 2 INCHES
OUTBOARD NACELLE	8 FEET 8 INCHES
LOWEST POINT OF FUSELAGE (NOSE GEAR POD)	3 FEET 6 INCHES


TURNING RADIUS AND GROUND CLEARANCE
NOTE:
Ground clearances are for static condition, strut extension for nose gear 1.5", main gear 1.0"
C-9
72.1 FT MINIMUM TAXI STRIP FOR 180 DEGREES TURN
64.1 FT
TAIL CLEARANCE ARC IS GREATER THAN WING
56.2 FT
54.0 FT
VERTICAL CLEARANCE
TOP OF FUSELAGE (VHF ANTENNA).....15' 9"
VERTICAL STABILIZER27' 6"
MINIMUM GROUND CLEARANCE
WING TIP.....7' 3"
BOTTOM OF FUSELAGE (VHF ANTENNA) ....2' 0"
61.2 FT
TOWING ANGLE 90 DEGREES (MAXIMUM LIMIT STOP 102 DEGREES)
82 DEGREES MAXIMUM STEERING ANGLE



What the Heck is *TMF*?

About once a year, (or more often if we feel there's a need), we like to sit down, resurrect *The MAC Flyer's* mandate and review some of its more significant aspects with you. So, here goes.

The pubs folks call us MACRP 127-5, which means we are a MAC Recurring Publication. *TMF* is, by a mandate set forth over 32 years ago, the command's "primary medium for conveying professional and educational flight safety material" to every one of you. We aim the bulk of our articles at crewmembers and direct support people. So, our policy is to limit the contents of the magazine almost exclusively to flight safety-related topics.

We've been a flight safety publication from the very beginning, so for that reason, we're in the MAC Inspector General's chain of command. We are *not*, and never have been, a public affairs publication. Again, we cover flight safety topics--how crewmembers overcame a critical inflight emergency; human factors; materiel failures; or professional readings. We keep pure press releases out of our pages as feature articles. We do use examples of people who "done good" to emphasize pertinent safety points. Our aim is not to make public jackanapes out of anyone, but simply to give you the opportunity to learn from others' mistakes and kudos.

We don't limit our scope to purely military material, either. For obvious reasons, the crosstell value of commercial incidents is extremely useful to us. Besides, it isn't protected under AFR 127-4, and is readily available for publication and mishap prevention purposes. This crosstell is widely practiced among flight safety publications to the benefit of all.

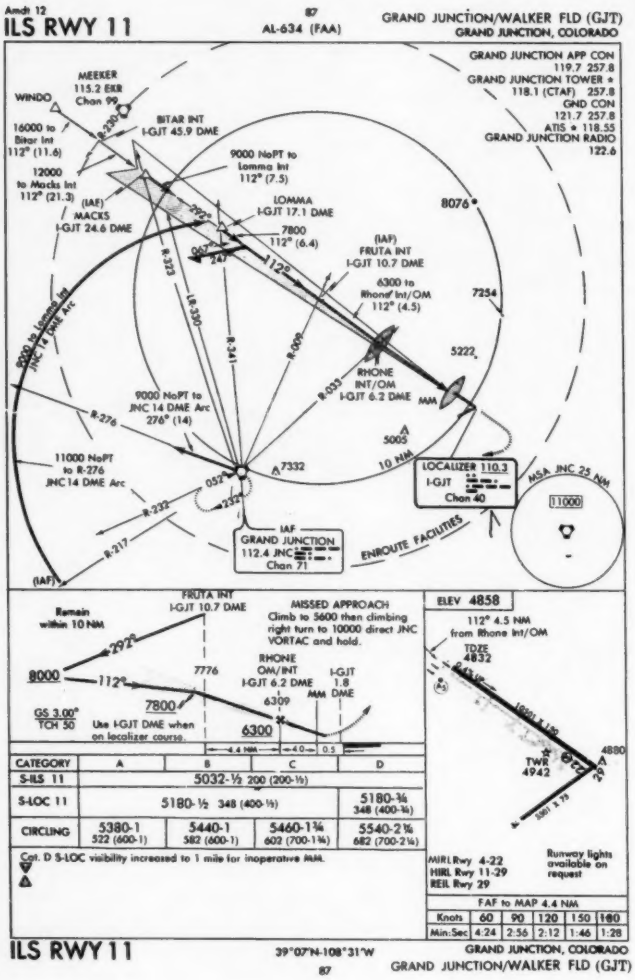
You may have wondered why so much time passes between a major mishap and its coverage in the magazine. Well, there are two factors which influence timeliness. First, safety investigation boards work at a deliberate pace and it takes time for their official determination to become public. Second, other than our "After Deadlines," everything printed in *TMF* is scheduled at least *three months* ahead of the published date.

Most of the time, we're able to disguise military mishaps so well even the principal players have difficulty recognizing their own mishaps. Mishaps do occur, and precluding recurrence is our aim. What's important is telling what happened and how it can be prevented. Furthermore, AFR 127-4 directs we sanitize published mishaps reports in order to protect their "privileged" status. We don't need someone using a *TMF* article as "Exhibit One" in a lawsuit. Other sources, such as NTSB reports, are covered by a different set of rules.

We *love* getting inputs from the field in the form of articles, reports, etc., however, we do reserve the right to make editorial changes which we feel will improve the material without altering the intended meaning.We will also participate as safety observers on exercises if requested to do so, and there is a safety story unfolding. There's a real world out there and we enjoy opportunities to keep in contact with it.

TMF promotes flight safety by providing a forum devoted to bringing to your attention a variety of mishaps from which you can learn a lesson or two. We also try to offer suggestions which we hope will prevent future disasters. *That's* what *TMF* is all about. ***TCW***

TMF Instrument Quiz



What a raw deal! Some crewmembers get to fly to faraway, exotic places. Often they get to meet new and interesting people—sample unusual delicacies of the region, and partake of the pleasant spirits and beverages native to the location. Sure, some people get those good missions, but do you? Noooooooooo! Instead, you get to fly to Grand Junction, Colorado.

Well, relax. Things aren't that bad. As a matter of fact, the Rockies are beautiful this time of year—a little bit chilly—but beautiful nevertheless. Besides, you can eat all the Rocky Mountain Oysters you can handle and the home brew isn't bad either.

However, before we can enjoy our stay in Grand Junction, we have to get there. So let's take a look at the ILS Runway 11 approach into Grand Junction/Walker Field to ensure we'll arrive safely. To do this, how about a few questions?

1. As a minimum, what equipment is necessary in order to fly the localizer approach?
   a. Localizer, glideslope, dual VOR.
   b. Localizer and DME.
   c. TACAN and localizer.
   d. All of the equipment listed above is required.

2. Okay, now you're flying inbound to the JNC VORTAC on the JNC 217° radial at 20 DME. Grand Junction approach clears you for the ILS Runway 11 approach via the IAF located on the JNC 217° radial at 14 DME. There is no wind and your true air speed is 135 knots. The technique recommended in AFM 51-37 suggests you use _____ as a lead point for your turn to intercept the 14 DME arc.
   a. 1 mile
   b. ½ mile
   c. 2 miles
   d. ¼ mile

3. So far, so good. You are now arcing on the JNC 14 DME and are crossing the JNC 232° radial, descending to 9,000 feet. You should:
   a. be prepared to climb back to 11,000 feet before you reach the JNC 276° radial.
   b. inform ATC so they know you have vacated a previously assigned altitude.
   c. inform ATC so they can begin making funeral arrangements—you're way too low!
   d. begin looking at the approach plate.

4. Finally you're about to intercept the localizer course inbound, you are cleared for the approach, and level at 9,000 feet. Once you're established on course, to what altitude should you descend?

a. 8,000 feet.
b. 7,500 feet.
c. 7,800 feet.
d. You're not authorized to descend until you intercept the glide path.

5. After intercepting the glide slope, you begin your descent. However, in the process you get distracted (thinking about the wonderful night ahead) and don't notice you've allowed the aircraft to fly well above glide slope. In fact, the CDI shows the aircraft to be two dots (full scale deflection) above glide slope. You should:

a. Continue descent to decision height (DH).
b. Descend no lower than localizer minimums.
c. Continue descent to DH only if the glide slope is recaptured.
d. Both b and c are correct.
e. Sign your copilot up as ballast for your next heavy equipment drop—he should have caught the error sooner. After all, it couldn't have been your mistake.

6. Let's suppose you're flying the localizer approach for Runway 11. Assuming an approach speed of 120 knots, the time inbound from the final approach fix to the missed approach point is 2 minutes and 12 seconds. This missed approach point is collocated with the _____.

a. middle marker
b. I-GJT 1.8 DME
c. I-GJT 4.4 DME
d. I-GJT 2.1 DME

7. All right, you're back flying the ILS approach. You reach decision height and you don't break out! Your trusty copilot reads back the missed approach procedure. You climb the aircraft straight ahead until it reaches 5,600 feet and then you begin a right climbing turn to proceed direct to the JNC VORTAC. After you roll out of the turn, you discover a no-wind heading of 273° is doing the trick and flying you direct to JNC. Because of your aircraft's speed, you don't consider yourself conveniently aligned for a teardrop entry into holding. Using AFM 51-37 holding pattern entry techniques, what should your initial action be after station passage at JNC?

a. Tell the copilot it's "his airplane."
b. Turn left to 232°.
c. Turn right to 232°.
d. Turn left to 052°.

8. After entering holding at JNC, Grand Junction Approach Control informs you the weather is getting better by the minute and asks if you want to give it another go. You say, "Sure, why not?" and Approach gives you an "expect approach clearance time" of 1545. It is now 1540. Suddenly you lose all communication with anybody who counts (and even with those who can't count). At 1545 you should: _____.

a. proceed to your alternate at 11,000 feet
b. depart the JNC VORTAC and proceed direct to FRUTA Intersection at 8,000 feet
c. depart the JNC VORTAC on the 276° radial and descend to 9,000 feet
d. depart the JNC VORTAC on the 276° radial, maintaining 10,000 feet until established on the JNC 14 DME Arc

9. Well, what do you know?! I guess the old saying, "If at first you don't succeed, try, try again" is true because you broke out of the weather on the second ILS and landed. Oh, by the way, what was the length of Runway 11?

a. 4,858 feet.
b. 10,501 feet.
c. 4,832 feet.
d. 11,600 feet.

So much for another day of slipping the surly bonds. Now it's off to discover all the wonderful sights and sounds of Grand Junction, Colorado. We hope you have as much fun downtown as you had flying the approach that got you there. By the way, if you had a little trouble interpreting this approach plate, then we're sure you'll agree with us when we say it pays to study the approach plate before you get to the initial approach fix. Cheers, from *TMF* eh?

THE ANSWERS

1. b, AFM 51-37
2. c, IAP
3. c, IAP
4. c, AFM 51-37
5. c, IAP
6. b, IAP
7. b, AFM 51-37
8. c, Flight Information Handbook
9. b, IAP

Reporting Points

What I *really* meant was . . .

NASA's Aviation Safety Reporting System (ASRS) provides an excellent vehicle for examination of the problems encountered in the workings of our nation's aviation system. A study of the reports submitted to ASRS revealed a startling, but not unexpected, finding: 70% of the reports to ASRS involve some type of oral communication problem related to the operation of an aircraft. The nature of the reported problems varied widely, ranging from failure to originate an appropriate message to failure of the intended receiver to comprehend and confirm the message accurately.

The ten generic types of communication problems identified were:

1. Misinterpretable—phonetic similarity;
2. Inaccurate—transposition;
3. Other inaccuracies in content;
4. Incomplete content;
5. Ambiguous phraseology;
6. Untimely transmission;
7. Garbled phraseology;
8. Absent—not sent;
9. Absent—equipment failure;
10. Recipient not monitoring . . .

The following definitions of frequently used phrases extracted from the Pilot/Controller Glossary in the *Air Traffic Controller's Handbook* will, hopefully, help you avoid such difficulties and better understand what you hear over the airwaves.

ABORT—To terminate a preplanned aircraft maneuver; e.g., an aborted takeoff.

ACKNOWLEDGE—Let me know that you have received and understood my message.

ADVISE INTENTIONS—Tell me what you plan to do.

ALTITUDE RESTRICTIONS ARE CANCELLED—Adherence to previously imposed altitude restrictions is no longer required during a climb or descent.

CIRCLE TO RUNWAY (RUNWAY NUMBERED)—Used by ATC to inform the pilot he/she must circle to land because the runway in use is other than the runway aligned with the instrument approach procedure. When the direction of the circling maneuver in relation to the airport/runway is required, the controller will state the direction and specify a left or right downwind or base leg as appropriate.

CIRCLING APPROACH—Maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or desirable. This maneuver is made only after ATC authorization has been obtained and the pilot has established visual reference to the airport.

CLEARED AS FILED—Means the aircraft is cleared to proceed in accordance with the route of flight filed in the flight plan. This clearance does not include the altitude, SID, or SID transition.

CLEARED FOR (TYPE OF) APPROACH—ATC authorization for an aircraft to execute any standard or special instrument approach procedure for that airport. Normally, an aircraft will be cleared for a specific instrument approach procedure.

CLEARED FOR THE OPTION—ATC authorization for an aircraft to make a touch-and-go, low approach, missed approach, stop-and-go, or full stop landing at the discretion of the pilot. Normally used in training so an instructor can evaluate a student's performance under changing situations.

CLEARED THROUGH—ATC authorization for an aircraft to make intermediate stops at specified airports without refiling a flight plan while en route to the clearance limit.

CORRECTION—An error has been made in the transmission and the correct version follows.

CROSS (FIX) AT OR ABOVE (ALTITUDE)—Used by ATC when an altitude restriction at a specified fix is required. It does not prohibit the aircraft from crossing the fix at a higher altitude than specified; however, the higher altitude may not be one that will violate a succeeding altitude restriction or altitude assignment.

CROSS (FIX) AT OR BELOW (ALTITUDE)—Used by ATC when a maximum crossing altitude at a specific fix is required. It does not prohibit the aircraft from crossing the fix at a lower altitude; however, it must be at or above the minimum IFR altitude.

DIRECT—Straight line flight between two navigational aids, fixes, points, or any combination thereof. When used by pilots in describing off-airways routes, points defining direct route segments become compulsory reporting points unless the aircraft is under radar contact.

EXECUTE MISSED APPROACH—Instructions issued to a pilot making an instrument approach which means: Continue inbound to the missed approach point and execute the missed approach procedure as described on the Instrument Approach Procedure

Chart or as previously assigned by ATC. The pilot may climb immediately to the altitude specified in the missed approach procedure upon making a missed approach. No turns should be initiated prior to reaching the missed approach point. When conducting an ASR or PAR approach, execute the assigned missed approach procedure immediately upon receiving instructions to "execute missed approach."

EXPECT (ALTITUDE) AT (TIME) OR (FIX)—Used under certain conditions in a departure clearance to provide a pilot with an altitude to be used in the event of two-way communication failure.

EXPEDITE—Used by ATC when prompt compliance is required to avoid the development of an imminent situation.

30 AHEAD—Proceed with your message. Not to be used for any other purpose.

HAVE NUMBERS—Used by pilots to inform ATC they have received runway, wind, and altimeter information only.

IMMEDIATELY—Used by ATC when such action compliance is required to avoid an imminent situation.

INCREASE SPEED TO (SPEED)—Used by ATC to request pilots to adjust aircraft speed to a specific value for the purpose of providing desired spacing. Pilots are expected to maintain a speed of plus or minus 10 knots or 0.02 mach number of the specified number.

LOW ALTITUDE ALERT, CHECK YOUR ALTITUDE IMMEDIATELY—A safety alert issued by ATC to aircraft under their control if ATC is aware the aircraft is at an altitude which, in the controller's judgment, places the aircraft in unsafe proximity to terrain or obstructions. The controller may discontinue the issuance of further alerts if the pilot advises he is taking action to correct the situation.

MISSED APPROACH—A maneuver conducted by a pilot when an instrument approach cannot be completed to a landing. The route of flight and altitude are shown on instrument procedure charts. A pilot executing a missed approach prior to the Missed Approach Point (MAP) must continue along the final approach to the MAP. The pilot may climb immediately to the altitude specified in the missed approach procedure.
—A term used by the pilot to inform ATC he is executing the missed approach.
—At locations where ATC radar service is provided, the pilot should conform to radar vectors when provided by ATC in lieu of the published missed approach procedure.

OUT—The conversation is ended and no response is expected.

OVER—My transmission is ended; I expect a response.

PILOT'S DISCRETION—When used in conjunction with altitude assignments, means that ATC has offered the pilot the option of starting climb or descent whenever he/she wishes and conducting the climb or descent at any rate he wishes. He may temporarily level off at any intermediate altitude. However, once an altitude is vacated, he/she may not return to that altitude.

RADAR SERVICE TERMINATED—Used by ATC to inform a pilot he/she will no longer be provided any of the services that could be received while in radar contact. Radar service is automatically terminated and the pilot is not advised in the following cases.
—An aircraft cancels its IFR flight plan, except within a TCA, TRSA, ARSA, or where Stage II service is provided.
—An aircraft conducting an instrument, visual, or contact approach has landed or instructed to change to advisory frequency.
—An arriving VFR aircraft, receiving radar service to a tower-controlled airport within a TCA, TRSA, or where Stage II service is provided, has landed; for all other airports, is instructed to change to tower or advisory frequency.
—An aircraft completes a radar approach.

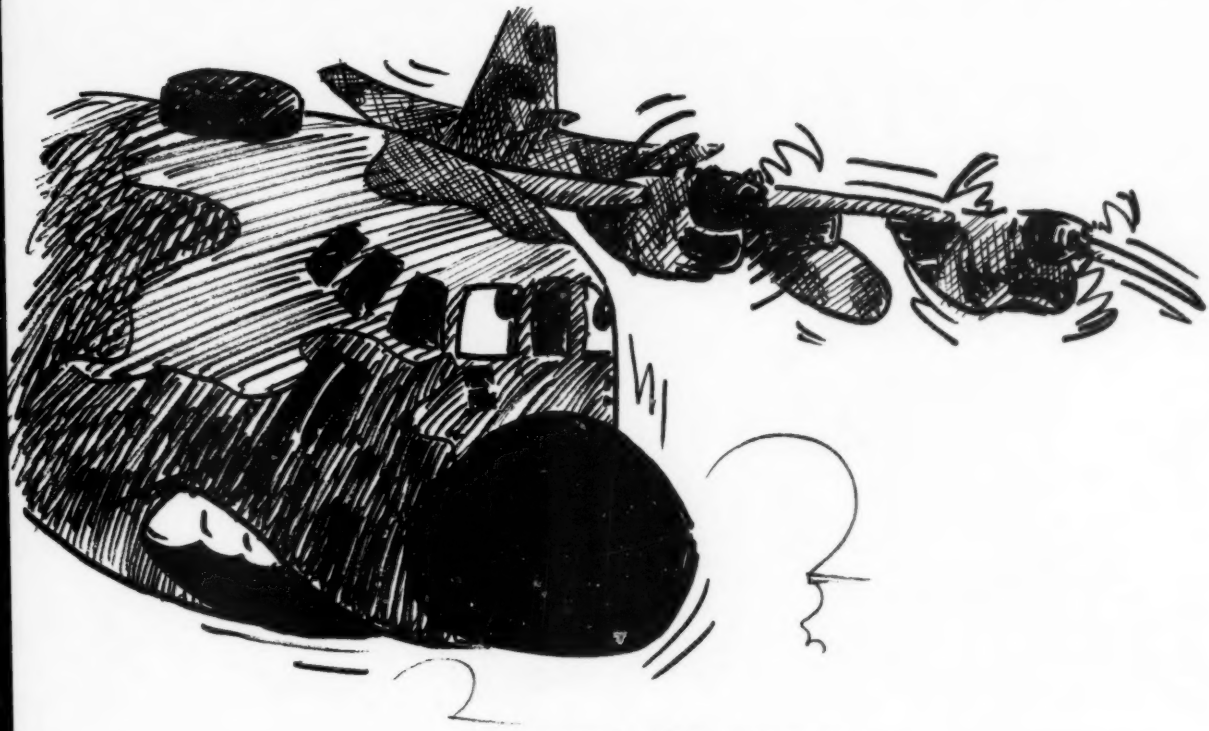
ROGER—I have received all of your last transmission. It should not be used to answer a question requiring a yes or no answer.

RUNWAY HEADING—The magnetic direction indicated by the runway number. When cleared to "fly/maintain runway heading," pilots are expected to comply with the ATC clearance by flying the heading indicated by the runway number without applying any drift correction; e.g., Runway 04, 040° magnetic heading; Runway 20, 200° magnetic heading.

WHEN ABLE—When used in conjunction with ATC instructions, gives the pilot the latitude to delay compliance until a condition or event has been reconciled. Unlike "pilot discretion," when instructions are prefaced "when able," the pilot is expected to seek the first opportunity to comply. Once a maneuver is initiated, the pilot is expected to continue until the specifications of the instruction have been met. "When able" should not be used when expeditious compliance is required.

WILCO—I have received your message, understand it, and will comply with it. ✈

QUICKSTOPPERS



FROZEN PROPSICLE

A local combat aircrew training sortie, planned for a grueling four-hour scenario to challenge the steely eyed crew to the limits, was terminated a bit early for this Herk complement. A mere 15 minutes after takeoff, the pilot's fun meter began to twitch as he detected a vibration in the number 1 throttle, disheartenningly verified by a like vibration in the corresponding condition lever. The pilot directed the engineer to scan the Number 1 engine and propeller. However, before the engineer could get out of his seat, the entire aircraft began shaking violently. Suspecting something amiss, the pilot directed the copilot to shut down the Number 1 engine. The vibration stopped, but not the fun. A visual inspection of the number 1 engine and propeller revealed the propeller had refused to go all the way to the feather position. Their collective fun meters now connected in series and abuzz with excitement, the crew nursed the ailing Herk safely back to friendly turf for some expert TLC.

Post flight examination confirmed the number 1 propeller blade froze in a near ground-range blade angle. This configuration would account for the vibration, since the propeller was now unbalanced. The unit maintainers continued the investigation by submitting a materiel deficiency report (MDR).

The response to the MDR revealed the mishap chain. Within the propeller assembly, the dowel pins and screws (that align the bushing with the blade) sheared. The shearing occurred because of binding, a result of a failed beveled thrust washer. The beveled thrust washer, in turn, failed for a reason. Metallurgical examination (appropriate since the washer is made of metal) exposed the ultimate cause — fatigue fractures. The beveled thrust washer fell victim to four fatigue fractures. Employing high-tech ocular assistance devices, examination showed a foreign body encapsuled within the metal. This non-metallic inclusion served as the origin of the primary fracture. This particle of not-from-here material, however, was not in excess of inspection standards. Don't you just hate it when that happens?

Quick Stoppers

A BUN FROM HOLLAND

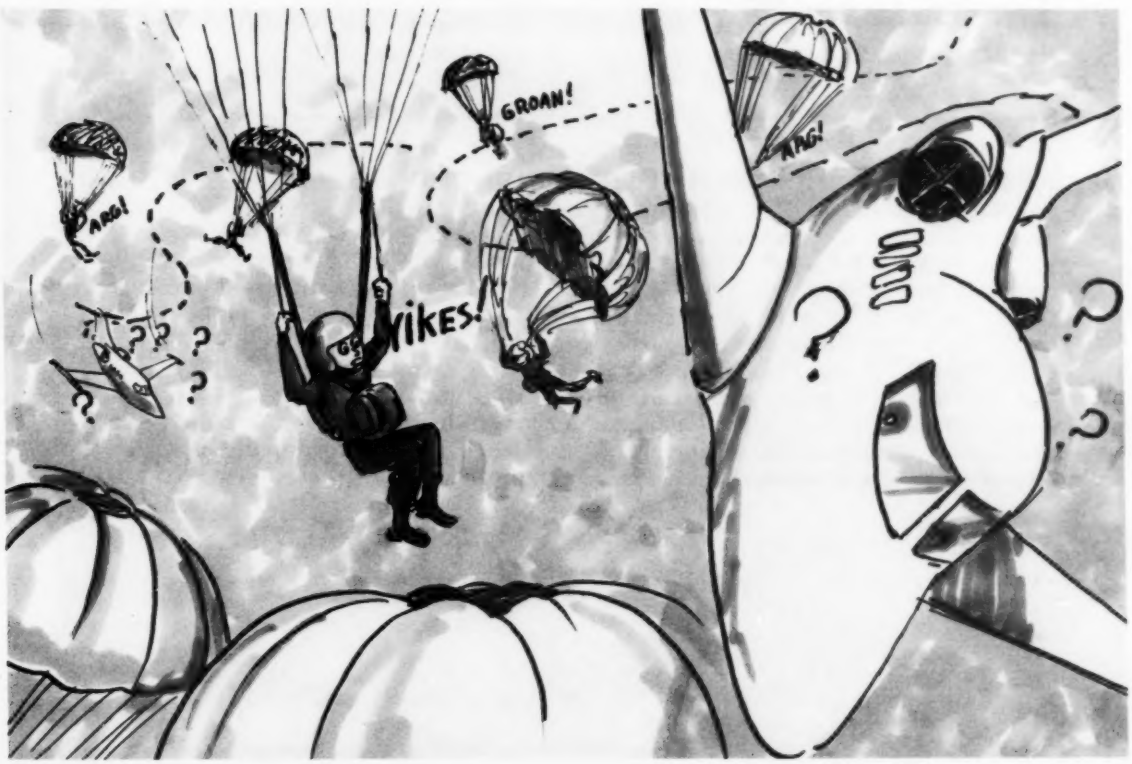
There they were, cruising along attentively at FL 410, when this Starlifter crew suddenly felt a slight pitchdown. The pilots quickly assessed they weren't responsible, so they focused their attention on the autopilot. Less than a minute later, the Number 2 Central Air Data Computer (CADC) inoperative light illuminated. Simultaneously, the copilot's instruments went into the simulator mode, complete with off flags for the airspeed indicator, altimeter, Mach indicator, and CDI. At this time the instrument readings were 300 knots, FL 240, and .80 Mach. The crew placed the Nav Sel to the neutral position, selected pitch off and Mach hold normal. Continuing its independent action policy, less than two minutes later, the aircraft began a non-human initiated left roll. At 20° left bank, the human element stepped in and disconnected the autopilot. The aircraft continued the roll to 30° left bank while the pilot tried to roll wings level (open the pod bay doors, Hal). The roll to 30° took 5 to 6 seconds. The human interface had to apply considerably more than normal control pressure to roll wings level. Once the aircraft was again successfully back in level flight, the organic interface reengaged the autopilot.

Immediately, the non-exorcised device began a right roll, but, aware of the lag time in the imperfect monitor, it quickly reversed itself back to the left, then to the right—Dutch Roll. Again the crew stepped in and disconnected the autopilot and regained a stable flight attitude. They expedited an approach and landing at a nearby military field, where the cantankerous computing devices were removed and replaced with more disciplined versions. This CADC was no ordinary CADC, however. It was one of a special brand being tested as a replacement to the present CADC used in the C-141 (CPU 43A), which is experiencing mechanical wear-out. The mode of failure, reported by the manufacturer, was a failure of both the unit's 15 volt power regulators. The manufacturer has redesigned the power supply unit for the production version as a result of this incident. Anyone for pastry?

COMING THROUGH!

The day's mission wasn't too complex, just your everyday high altitude parachute drop—no problem. The pilot maintained continuous radio contact with RAPCON. He informed them of the crews' intention to release human beings suspended by parachutes into the airstream surrounding their aircraft. However, he did not give the required five-minute warning call. The result of this omission was the release of human floaters into an active Military Air Training Zone (MATZ) (potentially unhealthy). The pilot gave tower a one-minute warning call (one-minute prior to drop, not a call of one-minute duration). This didn't give the controller sufficient time to coordinate MATZ closure. The controller did try to stop the jump, but his radio call was made after the jumpers were released.

The omitted five-minute call was required, as you might guess. It was the coordinated procedure to "assure clearance to drop." The letter of agreement goes further, including a requirement to ". . . maintain contact . . for direct coordination and safety advisories." So what happened? Once again a lack of crew coordination took a bite out of an otherwise well-executed mission. The aircraft commander had asked the copilot to make the required call, but the copilot forgot to do so. The solution, however, is not to superglue the copilot's lips to the overhead escape hatch, he does not bear the blame alone. Nay, but there was a whole crew aboard to ensure the procedures were followed. Besides, the copilot wasn't playing pinochle either, he was busy coordinating for clearance to climb to jump altitude, no trivial contribution to a successful airdrop, *while* monitoring RAPCON, tower, and jump ground control. A little help could have been very useful, especially in the eyes of the jumpers, who had to bob and weave their way to terra firma.



AFTER DEADLINES

MACRP 127-5 ENTERS 21st CENTURY—starting with this issue. The new look is the result of having the body text set by the hardworking staff of the 1201 Field Printing Squadron DARP folks. Up to now, the body text, which includes all printed words in *TMF* except titles, by lines and photo cutlines, was typed out via word processor. Now, thanks to some electronic magic (i.e. a MODEM), *TMF* is set in higher quality print produced by the equipment at the Field Printing Squadron. By providing *TMF's* contract printer with better quality (higher definition) print, the contractor can produce significantly sharper print in the final product. In addition, we get much greater layout flexibility.

AIR FORCE EXERCISES PURCHASE OPTION—and acquires 120 operational support aircraft (OSA). The Air Force has been leasing 80 C-21As, the military version of the Learjet 35A business/utility aircraft, and 40 C-12F Super King-Air 200s since 1983. At a cost of $230 million, this represents the largest lease/buy option plan ever for MAC. The Air Force made its decision to buy based on an estimated ten percent savings over the original lease/buy option. These popular jets were already in commercial use when the Air Force originally selected them. This avoided initial research and development costs. The aircraft replace the aging CT-39. MAC uses the C-21A and C-12F to deliver high-priority, time-sensitive cargo, age newly rated pilots, and, as a by-product, provide passenger airlift.

MEMBERS OF THE 438 MAW PARTICIPATE IN NASA STUDY—on the physiological and psychological effects of "long haul flights" on aircrews. McGuire crew members carried biomedical recorders, or "Vitalogs," day and night for a week during a NASA study. Every two minutes the small solid-state units measured electrical impulses from probes sampling temperature, heart rate, and activity. The research for the study began with the collection of data on short trips. It included more than 100 crewmembers participating in over 1,000 flight hours of field data collection, while 40 crewmembers participated in a full-mission simulation study. In addition to the probe data, each crewmember provided information on meals, sleep, exercise, and subjective mood and fatigue ratings over the course of the trip. Crews also completed questionnaires before each mission to provide background information. The study is expected to be complete in about a year.

☆ US GOVERNMENT PRINTING OFFICE: 1986 564-018/40003

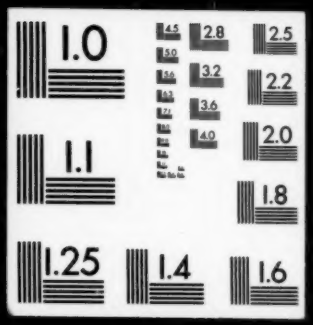
THE MAC Flyer

1986 ANNUAL INDEX

Title	Issue	Page
Contest Story		
A Real Instrument Landing	Jan	4
Letters To Home	Jan	16
Two Masks	Feb	4
A Chum Of A Navigator	Mar	4
A Routine Day	Apr	9
An Unanswered Question	May	3
The Great American Recall	Jun	3
Pound Fuelish	Jul	5
In Over His Head	Aug	3
Who's In Command?	Sep	3
Two Miles Short	Sep	17
Messages from Future Past	Oct	4
A Certified Tragedy	Nov	8
A Christmas Message	Dec	5
Cockpit Resource Management		
Picture this	Mar	12
Cockpit Resource Management	Aug	11
Pressing Problems	Aug	13
Supervisory Error	Oct	25
CHIRP	Nov	24
Taxi (Oops) Mishaps	Dec	17
ASRS Communication	Dec	24
Flying Hour Milestones		
	Jan	7
	Feb	7
	Mar	7
	Apr	3
	May	24
	Jul	20
	Aug	20
	Sep	13
	Nov	11
	Dec	16
Brad MacKenzie		
Functional Cockpit Design	Apr	22
The Human and The Mishap	May	11
A Learning Curve for Instructors	Jun	13
Another Heavy Equipment Drop	Jul	25
A Matter of Inches	Aug	20
Speak Up	Sep	6
Situational Awareness	Oct	8
Premission Planning	Nov	16
Invisible Killers	Dec	9
Physiology/Anthropometry		
Stress	Mar	18
No Sweat	May	8
The Limits of Sight	Jun	8
Physiology/Anthropometry		
A Dash One for the Body	Jun	20
Desert Survival	Jul	9
Hazards of Low-Level Flight	Aug	24
Fatigue	Nov	14
Night Vision	Nov	19
Awards		
Capt Salmon and Crew	Jan	23
Annual Awards	Mar	16
Maj Larry Brooks and Crew	Mar	8
Chief of Staff Award	May	16
Capt William Conroy	Jun	27
The Winners	Jul	4
Roll of Honor	Jul	16
Maj Kenneth Johnson and Crew	Jul	18
1st Lt Al Sherman and Crew	Jul	18
Volant Rodeo	Aug	16
Maj Johnny Wauchop and Crew	Oct	24
Instrument Procedures/Techniques		
RADAR	Feb	23
Crutches	May	25
The Invincible Color Radar	Jun	30
Terminal Radar Guidance	Sep	24
***TMF* Instrument Quiz**		
	Mar	10
	May	18
	Jul	21
	Nov	12
	Dec	21
C. R. Terror		
SNAFUs the SID	Jan	24
Fouls a Foot	Feb	16
Adieu	Mar	20
AWTH's Corner		
	Jan	14
	Mar	26
MWAM		
Adequate Vigilance	Feb	11
The Only Constant	Feb	27
Possible Factors	Apr	25
MWAM Death Sentence	Jun	23
A Door to Tragedy	Jul	12
Preferential Attention	Sep	9
An Elementary Accident	Oct	12
Weather		
Cold Wx Quiz	Jan	11
Helicopter In-flight Icing	Jan	19
The Invisible Hazard	Apr	4
Cumulonimbi	Apr	7
Tornado	Apr	20
Close Encounter	May	14
Microbursts	Oct	20
Winter Flying	Nov	21
General Safety-related Articles		
C-130 Throttle Alignment	Jan	9
Unexpected Consequences	Feb	8
Power and the Remote Approach	Feb	20
Fallacies in Aviation Safety	Apr	12
Toncontin Warning	Apr	15
Hangar Horrors	Apr	16
Gross Navigational Errors	May	5
Accident Sense	May	21
The Good Old Summertime	Jun	11
C-17	Jun	16
So, You're a Safety Board President?	Jul	23
Helicopter Aero-Vortex Ring State	Aug	8
Dutch Roll	Aug	26
The Broken Chain	Sep	14
Naval Maneuvers	Sep	19
Prop/Jet Blast	Sep	26
Here's a Nickle on the Grass	Sep	26
De Boids	Oct	16
Did You Know That?	Oct	22
IG Interview	Nov	4
What the Heck is *TMF*?	Dec	21

ASSOCIATE EDITORS NEEDED!

The world's best flight safety magazine—*TMF* of course—needs YOU! Reporting dates in April and July 1987. We're looking for rated captains or junior majors, preferably with a safety, journalism or public relations background. If interested (no IFs, you should be!) write to: Supervising Editor, The MAC Flyer, HQ MAC/IGFE, Scott AFB, Illinois 62225-5101; or call AUTOVON 576 - 3534/5542.


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0